FLYING AND POPULAR AVIATION

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CAN THE R.A.F. BE SMASHED?

The Inside Story of the Siege of London

A PSYCHOLOGY TEST FOR PILOTS

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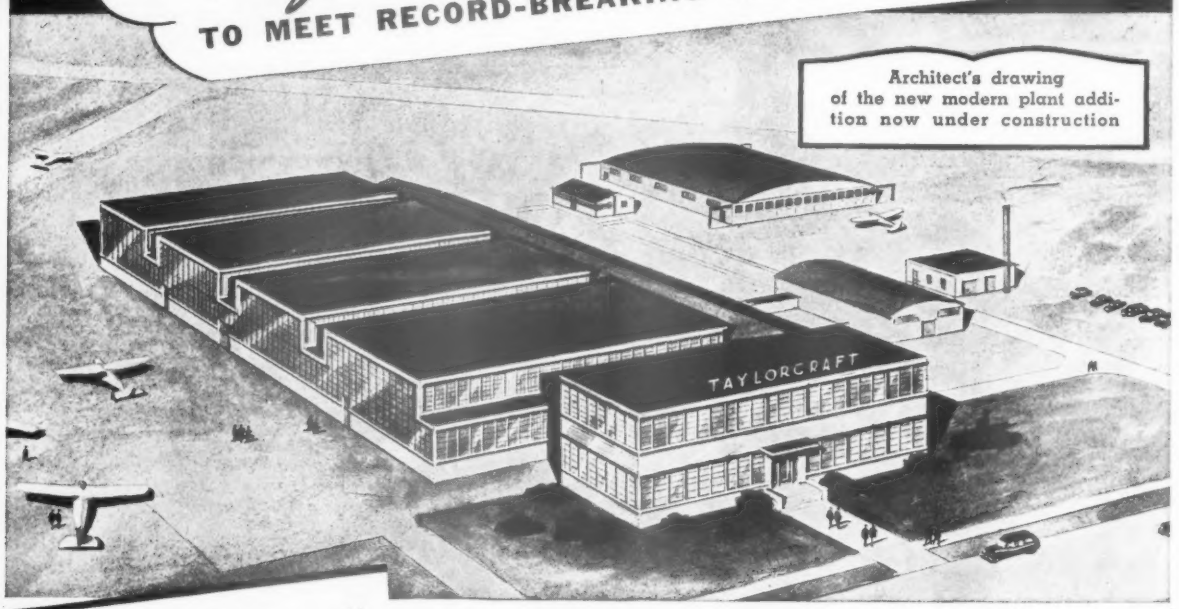
TAYLORCRAFT *Triples* PRODUCTION CAPACITY

TO MEET RECORD-BREAKING SALES DEMAND



Architect's drawing of the new modern plant addition now under construction

HIGHLIGHTS.. *Taylorcraft* EXPANSION PROGRAM

- New plant addition will increase floor space from 22,000 to 72,000 square feet.

★

- Designed by Albert Kahn, Inc., noted architects, the modern steel and brick building incorporates the latest refinements in plant layout.

★

- Straight-line assembly facilities are provided for each model Taylorcraft to give the most efficient production and operation economy.

★

- Annual production capacity will be tripled by this expansion.

★

- Building program now underway will be completed about mid-December.

MORE AND MORE THE "BEST-LIKED" PLANE FOR LOW-COST PRIVATE FLYING AND TRAINING

Everywhere it's being said—"Taylorcraft is the plane to buy." The experience of flight instructors, the comparison by private pilots—flying all makes of low-priced planes—has aroused tremendous enthusiasm for Taylorcraft's superior flying performance and enviable safety record. So great is demand for the outstanding Taylorcraft that production capacity is now being tripled with a new, modern plant addition. Greatly increased engineering facilities are also being provided to keep Taylorcraft as always, in the forefront of development. . . . If you have never flown a Taylorcraft, be sure to make a date today with a Taylorcraft dealer for a demonstration flight. Your own test will quickly prove the difference—the reason why Taylorcraft is the "best-liked" plane to fly and the "best-value" buy.

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DEPT. 114 ALLIANCE, OHIO

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You Too Can Climb Beyond That First Job with PARKS LEADERSHIP TRAINING

PARKS AIR COLLEGE was founded August 1, 1927.

Has enjoyed full Federal approval longer than any other aviation school.

Is accredited in its Aeronautical Engineering School by the Illinois Superintendent of Public Instruction.

Is accredited by the United States Office of Education of the Federal Security Agency.

Graduates are qualified educationally for appointment as flying cadets in the U. S. Army Air Corps and for flight training in the U. S. Naval Air Reserve.

Has a capacity enrollment of 300 commercial aviation students, 216 U. S. Army Air Corps flying cadets and 48 enlisted mechanics.

Has its own airport with a school plant of 25 buildings devoted to school purposes entirely, also two fields of 568 acres and 96 acres for military flight training.

Has a faculty of 82, each especially qualified for his particular field of instruction.

PARKS training will enable you actually to contribute to the progress and development of commercial aviation and so assure you of advancement.

You find Parks graduates in positions of trust and responsibility through all of aviation. Their training enabled them to enter the industry and advance to such positions as Chief Engineer, Chief Meteorologist, Chief Pilot, Captain, First Flight Officer, Traffic Manager, Factory Manager, and many, many others.

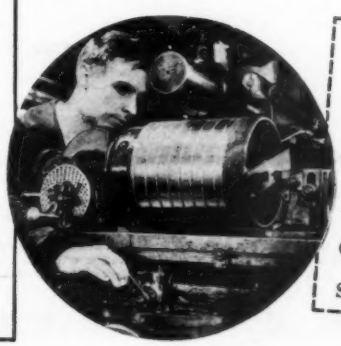
The reasons for the success of Parks graduates are well defined: (1) All training is of college and professional school level. (2) Each course is specialized. It points to a definite objective and, at the same time, it is comprehensive in its particular field. (3) Skills useful in aviation are developed, and, of equal or greater importance to you who want really to advance, *you become acquainted with the basic principles involved.* You learn the *why* as well as the *how.* You develop a capacity for independent, creative thinking on your own, and that is essential for leadership.

Four courses are offered. Each is foundation preparation for advancement in a major field of aviation. They are: Professional Flight and Executive, Aviation Operations and Executive, Aeronautical Engineering, Maintenance Engineering.

These courses are two years in length, excepting Aeronautical Engineering, which is two and one-quarter years. Each is open to the high school graduate who ranks in the upper two-thirds of his high school class.

If it is your purpose to advance to leadership in aviation, you are invited to send for complete information. It is included in the 64-page catalog, which is free. The coupon or a post card request will bring your copy promptly. Send for it now.

PARKS AIR COLLEGE East St. Louis, Illinois



PARKS AIR COLLEGE
East St. Louis, Illinois. Section PA-12

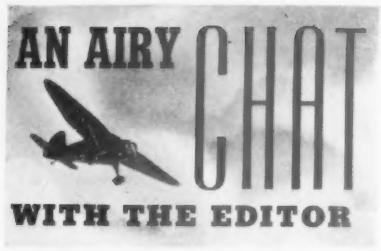
Please send me details of four major courses in commercial aviation training.

Name..... Age.....

Address.....

City.....

State.....



WE did some flying the other day that brought back vivid memories. The airplane was a new Ercoupe, a so-called "safety plane." Though it was a brand new plane, the experience itself was not new. We flew a ship with the same qualities some six years ago: the Stearman-Hammond. At that time we were so impressed with the ease and safety with which that ship could be flown that we wrote an article for this magazine describing the experience. We also threw in a few rash (at the time, at least) prophecies. It was our opinion then —and it is now, more than ever—that the real mass flying public wants the simplest airplane that can be produced. And by "mass flying public" we mean millions, not thousands. We said in that article six years ago (and we repeat it here) that there never will be a really *large* market for private aircraft until the manufacturers give the average man what he wants, not what they think he should have.

It is encouraging today to see some of these things coming to pass. The more progressive-minded manufacturers have done much to put the airplane in the hands of the air-minded man-on-the-street. Not many men relish the drawn-out process of having to take at least eight hours of dual instruction, go through additional hours of practicing spins, stalls, slips, take-offs and landings. Women in general just won't spend the time on such elaborate requirements.

The Ercoupe showed itself to be another step in the right direction. We took off easily from a little clearing of about 1,000 feet in length. She climbed out of that field so steeply that, for a moment, we lost track of the horizon. In level flight any maneuver consisted of a slight turn of the wheel; rudder control is automatically coupled to the wheel, which also controls ailerons, elevators and steers the nose wheel on the ground. Landings consist of a shallow dive at the field, a plump onto the tricycle gear's shock absorbers and the gentle application of the brakes. From then on, you merely drive the ship across the airport just as you would your automobile.

* * *

WE'RE playing a hunch with "Want a Job?" on page 43. For several years we had deliberately side-stepped many requests we had for employment information. Until, that is, William Hurd Barrett pointed out one day that it might not be a bad idea to face the problem squarely. With the aviation industry clamoring for skilled labor and our readers constantly asking for advice, we found ourselves agreeing enthusiastically with Mr. Barrett—despite the fact that we think it a good policy to publish as

(*Continued on page 72*)

FLYING AND POPULAR AVIATION

Trade-mark Registered

Volume XXVII Number 6

Contents

DECEMBER, 1940

The Aerial Siege of London	Leonard Engel	12
Air Camping Is Sport!	Wolfgang Langewiesche	14
Yankee Stuka (full page photograph)		17
The Dirigible Is Dead!	Lieut.-Col. Karl S. Axtater	18
Canada Supplies the Pilots	James Montagnes	20
Whopper		23
Overseas Mission	John C. A. Watkins	24
Specialists in the Air Corps	Maj. Roland Birnn	26
Can You Fly?	John R. Hoyt	30
"Rags to Riches" Airline	Milton Van Slyck	32
Norway Flies On	Kurt Rand	35
Finance Your Flying	DeWitt Wendell	37
Free Flights for Cash	Doris Ahnstrom	38
You Don't Say!		40
I Learned About Flying from That!—No. 20	Paul V. Gustine	41
Want a Job?	William Hurd Barrett	43
AOPA News		45
500 Miles—and Faster	Raoul J. Hoffman	47
Have You Seen?		48
The Model Department		50

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You, who plan to invest in a course of career training, to prepare yourself for the future, must determine in advance what the returns will be on your investment before you put cash on the line. This is imperative since your choice of a school in which to take your training will determine how much money you will make all the rest of your life. Your whole future in aviation depends on your training.

Curtiss-Wright Tech's career training is carefully designed to do just one thing:—TO MAKE MORE MONEY FOR YOU so upon graduation you can be independent and self-supporting for life. For years our hundreds of successful graduates have proven that Curtiss-Wright Tech training gets results and always pays. It has provided them with a profitable occupation and secure future since it trained them in advance for the highest position they could ever expect to occupy. It can do the same for you.

Aviation needs trained men. They are in demand and at a premium. Advancements for them are rapid, especially here in Southern California where there are over $234,000,000.00 in unfilled aircraft orders on hand and where over fifty per cent of all aircraft manufactured in the United States is made. You can get in on the ground floor by training now. BUT you must choose the right school for your training.

Our graduates are obtaining immediate employment and the demand for them far exceeds the supply. We honestly believe that every student who enrolls here will be able to obtain, with our assistance, immediate employment upon graduation. This school has never guaranteed or promised positions for its graduates, but practically every graduate has obtained immediate employment, and is advancing steadily.

WARNING!—"don't miss the boat." The greatest opportunity of your lifetime exists today! There never was such an opportunity in aviation for you; there may never be another. A position awaits you. Insure for yourself a steady income and independence for life. Send in your enrollment today before you "miss the boat."

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- ☆ Aircraft Blue Print Reading Course, home study (4 months)

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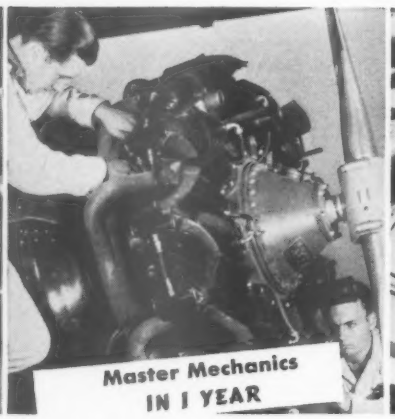
THIS TRAINING *places*

Never before has the demand for trained pilots been so urgent as it is today. Airline expansion is actually being retarded because of the acute shortage of competently trained pilots. Flight instructors are in demand everywhere. Because of California Flyers' modern fleet and proven training it is absolutely impossible for us to supply the requests for graduate pilots.



In aviation the Master Mechanic is the man responsible for the production, operation and maintenance of the world's great air fleets. At California Flyers the Master Mechanic student receives the practical training that prepares him for a position with airlines and aircraft plants. And it is this training that assures him immediate employment and rapid advancement.

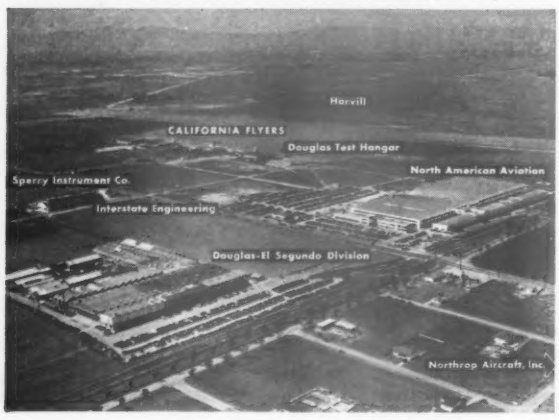
Because the Aeronautical Engineering student at California Flyers trains in the center of modern aviation in America, in the city where half of the Nation's planes are engineered he learns the latest not only in design and engineering but in modern plant procedure. Because of this advanced training the California Flyers graduate's services are in demand everywhere.

and WE CAN'T SUPPLY THE

Yes, you're that close to a position in aviation! Four months to 24 months from the day you enroll at California Flyers, depending on the course, you will be ready for a position in aviation, a position unparalleled in opportunity. And what is more important, a position is waiting for you for ***it is impossible for California Flyers to supply the demand for its graduates.***

Why does California Flyers put you in aviation faster? Here is the answer. From the day you enroll at California Flyers you are *in* aviation, preparing to do your share in the Defense Program. No time is wasted in unrelated, academic subjects. What you get is thorough, practical, industry training geared to the needs of the aviation industry and geared to the needs of our National Defense. What is more important, this training is specified training . . . specified by the industry to fulfill its needs.

California Flyers is not only located in the Nation's Aviation Capital but on the very airport that is the home of these famous aircraft plants.



California Flyers is one of the few schools in the country that recognizes the vital need for specialized training, the need not only for Aeronautical Engineers, but for Aircraft Draftsmen—not only for Master Mechanics, but for Production Mechanics and Instrument Technicians—not only for Airline Pilots, but for Commercial Pilots and Flight Instructors. So it is that California Flyers gives you the opportunity of choosing a particular course that best suits your natural talents, and gives you the training which in a shorter space of time fits you for a career in the particular branch of your chosen field.

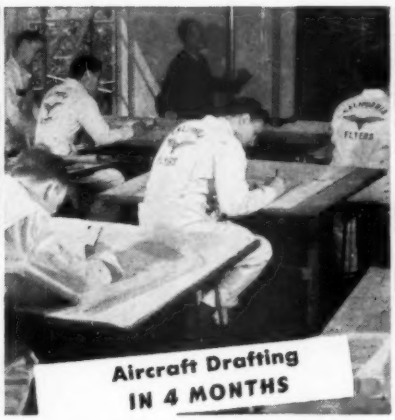
Why is there such an unprecedented demand for our graduates? An important reason is California Flyers' location in the very heart of aviation in America, on the same airport with the plants of North American, Douglas-El Segundo and Interstate, on the very test field where the famous planes of Douglas, Lockheed, Northrop and Vultee have been tested and proved, in the city which is a terminus for United Airlines, Transcontinental and Western Air, American Airlines and Western Air Express. It is a school that is an integral part of this aviation picture. It is a school which through day to day personal contact works hand and hand with the industry, meeting the industry's personnel problems with men trained to its specifications. *Is it any wonder that this school cannot supply the demand for its graduates?*

California Flyers is not only approved by the United States Government for Flight and Master Mechanics Courses, selected by the Civil Aeronautics Authority for primary and advanced flight training, but it is one of the few schools chosen by the U. S. Army Air Corps to train its aviation mechanics. It is the school you, too, should choose.

CLIP THE COUPON ON OPPOSITE PAGE

YOU IN AVIATION *in 4 to 24 months*

The Production Mechanic is the aircraft builder. Because this is the largest field in aviation, the young man entering this branch has unlimited opportunities. At California Flyers the Production Mechanics student is trained to do not only one thing well, but all phases of production from metal forming to final assembly. It is this thorough training that takes him to the top.



Throughout every stage of planning and production the Aircraft Draftsman is the right hand of the men responsible for the successful design and engineering of the airplane. The young man enrolling at California Flyers secures training that is clear, concise and easy to master. Because of this thorough practical training the graduate's opportunities are unlimited.

With the increased use of instruments the position of Instrument Technician has become of vital importance. At California Flyers the student trains in an active maintenance shop. It is this type of training that prepares him for the many opportunities in the Instrument field—a position in an aircraft plant, an airline, the Civil Service or he may operate his own business.

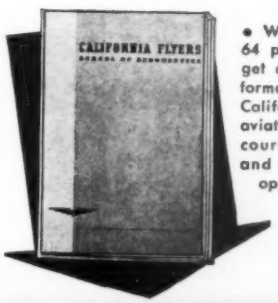
DEMAND FOR OUR GRADUATES

"I am a California Flyers Graduate." It means something to say that. It means that aviation wants you to the extent that over 96% of all California Flyers graduates are employed in the industry and there are consistently more requests for our graduates than we can supply. It is a passport into aviation. It means also that you are a man marked to succeed like the California Flyers men before you. And that is what *really* counts.

Why does a California Flyers man stand so high? It is obvious once you have heard the complete story of this famous school. Its founders believe that aviation should be taught in a school where the student remains an individual—learning aviation as it pertains to his individual ambitions and qualifications, and by so doing he is prepared for the responsibilities of leadership. This trains the graduate to meet today's aviation problems and to contribute to tomorrow's aviation advancement. This is the way today's leaders learned. Only this way can a training program be built for the industry, on industry specifications. They believe too that the entire field of aeronautics—engineering, mechanics and piloting are all closely interwoven and that a student should train in a school that teaches all of these important divisions. Above all, they believe that aviation should be taught in an environment of aviation activity, taught where there is the greatest number of men actively engaged in aviation. This is why California Flyers is located in the heart of the world's aviation capital on the world's busiest testing field.

If this is the kind of school you would like...friendly, efficient, modern and thorough, an aeronautical school operated by practical aviation men, you will be most interested in reading the *complete* story of California Flyers in the new 64 page catalog.

Send today for this catalog and vocational guide.



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Instrument Technician ☐ *Aircraft Drafting* ☐
Production Mechanics (Aircraft sheet metal) ☐

Name_____ Age_____

Address_____

City_____ State_____

The Birdmen's Perch

We think that maybe we've started something that will turn out to be mighty interesting in the Private Plane Insignia referred to below. I don't think anyone has really looked into the possibilities of decorating planes with individual insignia. Maybe we'll all get some swell ideas!

Major Al Williams, alias "Tattered Wing-Tips," Mgr., Gulf Aviation Products, Gulf Building, Pittsburgh, Pa.

NEW BUSINESS DEPT. (Cont'd)

We wish you could have the fun of seeing all the private plane insignia that are coming in. The Army and the Navy boys have done a mighty clever job of thinking up trick insignia and it should be pretty interesting to see what the private plane owner has been doing. So send yours along. We'll publish the best ones soon.

GOLD, PURE GOLD

Remember the mountaineers with shaggy ears who used to squat along the banks of California creeks, panning for gold? Their methods of separating the gold from the muck and dirt of the creek bottom were pretty primitive. Besides getting their feet wet every day, they probably let many a nugget of gold slip through their fingers.

Now panning gold and refining oil present much the same problem. In both cases you've got to separate the dirt and

waste from the real thing. And over the years methods have improved tremendously in getting both gold and oil.

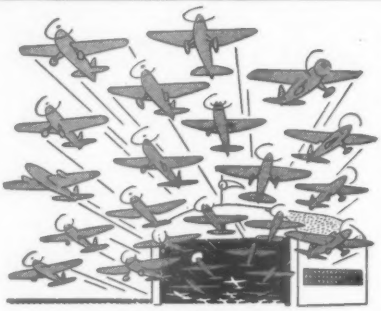
And when it comes to removing carbon-forming, sludge-producing wastes from motor oils, you have to doff your hat to the Alchlor process used in making Gulfpride. This Gulf-invented refining step is an "extra" that takes out additional quantities of the bad elements present in all oil, and leaves in *more* of the good ones.

The result: when you pour 100% Pure Pennsylvania Gulfpride into your engine, you give it the 24-carat protection it needs and deserves.

DO YOU BELIEVE IN DREAMS?

This one happened at a local airport the other day. The night watchman had just finished his duties at 6 A.M. and started talking with the manager of the airport.

"Last night," said the watchman, "I had a very peculiar dream. I dreamed that



someone had opened the doors of the hangar and that all the planes had flown off of their own accord. Nobody could be seen at the controls—but off they went."

"Nonsense!" replied the manager. "Planes don't just up and fly off by themselves. You've been eating the wrong kind of pie."

The manager, who was in a hurry to get started on a business trip, then left the watchman. But several days later, when he returned, he summoned the watchman to his office and fired him.

Why?

(Will admit you took us over the jumps on the cigarette puzzle last month. This one is tougher. Send your answers to T.W.T. We'll let you know whether you got it, by return mail.)

THIS MONTH'S WHOPPER

(Distaff Side)

Dear Major:

Don't breathe a word to my instructor—he hasn't found it out yet—but last week I had a forced landing on my first solo flight and washed out a tire.

It turned out to be a lonely and wild section, so I set out on foot to get to a telephone. Well, first thing you know, I looked

up and there's a big, ugly rattlesnake lying across the narrow trail I was climbing. And he *wasn't* dozing!

He had that look in his eye that said, "I've had a hankering for something all day, and now I know what it is—a nice juicy bite of leg!" Now no snake-in-the-grass can look at little Betti like that and get away with it. The nearest thing at hand with which a girl might protect herself was a jug of G.A.G. I carry just for emergencies. So, grasping it firmly by the handle, I let fly. The jug of G.A.G. caught that reptilian masher right on the noggin, and the last I saw of him as I hurriedly retreated down the trail, he was licking up the splattered drops of G.A.G. with a happy, if surprised, grin on his face.

After I got back to the plane and had been sitting there about two minutes, I looked up and there was my little friend sitting up on his tail in front of me, begging for more. So I siphoned a pint out of the tank for him, and before you could say "San Luis Obispo" he was telling me about the wife and kiddies and what the boss had said to him and what he'd said back. I could see a crying jag coming on, so I quickly told him all about the washed-out tire on my plane.

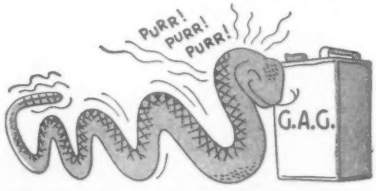
Well, the G.A.G. made him so smart he knew just what I meant. He went up to the wheel and curled himself around it with his tail in his mouth and says, "Well, what are we waiting for?"

"Nothing," I replied, taking off and beating it for home.

Now, major, the only thing that's troubling me is what to do with Lefty—that's what I call him. The SPCA has been after me, but Lefty refuses to untwist himself from the wheel. He claims it makes him feel good, getting his back scratched whenever I take off.

Since it's all G.A.G.'s fault, do you think you could square things with the SPCA for me?

Sincerely yours, **Betti D. Frye**



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Please send information on Aero ITI training for Aviation careers. I am interested in the following branch of Aviation: ☐ Aircraft Mechanics; ☐ Aeronautical Engineering; ☐ Undecided, please send more information. Years High School: ☐ 1, ☐ 2, ☐ 3, ☐ 4. Years College (Liberal Arts): ☐ 1, ☐ 2, ☐ 3, ☐ 4. Years Engineering College: ☐ 1, ☐ 2, ☐ 3, ☐ 4.

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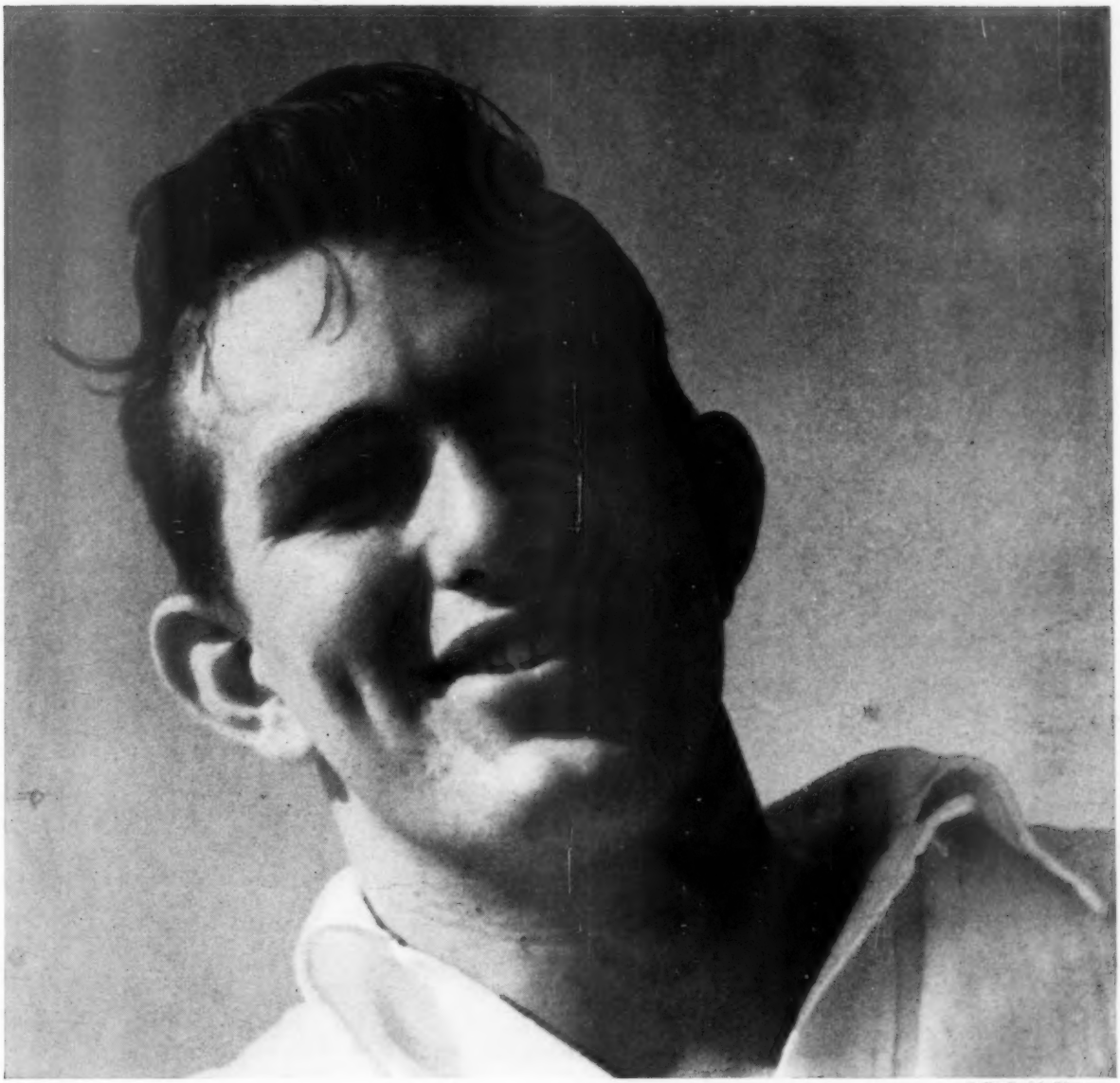

Polly Smith Photo

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THE AERIAL SIEGE OF LONDON

by LEONARD ENGEL

For the first time in world history, airplanes alone are attempting to batter an empire to its knees. But the Royal Air Force seems to have saved England almost single-handed.

Many Nazi bombers like the Dorniers at the top of this page have met the fate of this invader shot down into London.

"Sky writing" above actually is exhaust condensation of high-fighting R.A.F. and Nazi planes.

These carefree British pilots of a "Hurricane" squadron were photographed as they rested between patrols. Some of these were in fight shown at left.

THIS is the story of the first aerial siege in history, the Battle of London. Some of it has been told before, some not. There are censors in the way and many of those who must do the telling are so close to it that they cannot see the air war as a whole for the bombs.

Large-scale raids on England began August 8. The first bombs in London proper fell the night of August 22-23. It was not until September 8, however, that the furious night-after-night assaults which constitute the siege of the world's largest city began. As this is written, the siege still is under way and will probably continue through the winter.

It is never easy to gauge the exact purpose of any Nazi maneuver, the air attack on England included, for the German high command has shown that it changes its tactics more readily and more frequently than any other group of military leaders. Hitler and his lieutenants never commit themselves so thoroughly in advance (I am talking about Hitler's actions, not his words) to any particular campaign that they cannot change to something else, if the first objective proves impossible.

The *Luftwaffe* mission in the bombardment of England has been clear from the outset: to knock out the Royal Air Force, gain control of the air and destroy British shipping, docks, naval bases, means of communication and industries. But the Germans probably had not decided just what was to follow, when and if the *Luftwaffe* completed its first assignments. The follow-up could have been an attempt to win by airpower alone, or by invasion, or blockade, or any combination of the three. The Nazis made preparations for each and then sat down to wait for circumstances to make a choice.

At the risk of being proved wrong even before this appears, however, it would seem that the R.A.F. still is so far from being knocked out that these plans have all been abandoned. That is, the blockade and the bombardment of British cities will continue, but they alone will not be counted on to win the war.

Command of the air is a necessary prerequisite if the main reliance is to be placed on any of these three tactics. Take invasion, for example. Planes are the only means of silencing the shore batteries which would otherwise take a prohibitive toll of the invaders as they came off their boats and before they could get set on the beach. But gun emplacements are small targets. They are difficult to hit in any case—and more so when a defending fighter is on your tail. They cannot be bombed with sure success unless the air is first cleared of defending pursuit aviation.

As invasion hopes have glimmered, the Nazis seeem to have changed their strategy. The bombing of London during September and October appears to have beeen designed to keep the R.A.F. busy in England and prevent the sending of air reinforcements to Suez, where Italy was setting the stage for a drive to break the back of the British Empire. The R.A.F. has less than 500 warplanes in the Near East and is badly outnumbered even by the relatively small Italian air force, whose current first-line strength is less than 3,000 planes (FLYING AND POPULAR AVIATION, July, 1940). And the Nazis hope that systematic destruction of property and lives will, in conjunction with a major defeat elsewhere—such as in the Near East—compel the British to make peace.

The raids can be divided into three periods. During the first, from August 11 to 17, following the August 8 start of intensive activity and a two-day letup, the *Luftwaffe* sent massed formations of fighters and bombers by daylight across the English Channel and the North Sea. Then followed four days of relatively slight activity, to be succeeded by the second period, during which activity steadily increased. During this second period, the *Luftwaffe* sent its planes across in small formations or even singly both by day and by night, with an increasing emphasis on night activity. The third period dates from September 8, the start of the siege of London.

The Nazis never lost sight of their objective of knocking out the R.A.F. This was to be accomplished chiefly, it was hoped, by wearing British pilots out—simply by keeping them continuously in the air. Despite the greater attention focused on the R.A.F.'s numerical inferiority in planes, the real British problem throughout the last three months has not been a shortage of machines, but of men.

The *Luftwaffe* had, at the start of all-out air war, it is estimated, between 15,000 and 17,000 combat craft—pursuit, bombardment and observation; the British, some 6,000 to 7,000. The German plane margin, however, is cut down considerably by the fact that *Luftwaffe* planes are out of action and in overhaul about 60 per cent of the time. The corresponding British figure is 25 per cent. Thus, the Nazis cannot put more than 6,000 planes a day aloft over any protracted period. The British, if they had the pilots, could keep 4,000 of theirs in the sky.

"If they had the pilots"—that was the British rub. The last war showed that pilots can stand only two missions a week

(*Continued on page 52*)

The beach is an excellent site for the air camper, providing he observes a few precautions pointed out by the author.

AIR CAMPING IS Sport!

The aerial vacation is not a thing of the future; it's here to stay. The modern lightplane is ideal for cross-country touring. The author, a veteran air camper, passes on a few tips on how the average flyer can enjoy his airplane.

by WOLFGANG LANGEWIESCHE

IF you want to have more fun with airplanes, consider air camping. A night spent outdoors by your staked-down ship at some beach, or some farmer's field, or even at an airport, fits equally well into a week-end hop and a transcontinental tour. Camping out always is fun if done right. If done with airplanes it makes, moreover, very good sense in terms of money, time and convenience.

Consider where the lightplane tourist's time and money goes. In the first place, he is likely to spend on each night's hangar, taxi fare and hotel about as much as he spends on each day's actual flying. An aerial camping trip, by contrast, need cost little more than one's food and one's gas and oil, and the same vacation budget will take you about twice as far.

In the second place, the tourist often spends the day's best flying hours—the early morning—on the ground. An early morning start is the secret of efficient lightplane travel, for the noon hours are often rough, the afternoon is likely to produce thunderstorms and, later on, one begins to worry about getting in before dark. Also, an early start frees you some time around noon for a long rest and thus cuts down fatigue. But an early start is very hard to get in actual practice—and unpleasant, too: the getting up in the dark of night, the breakfast in the taxi-drivers' all-night joint, the many small delays while the night watchman is found, the hangar doors opened and one's ship extricated from among the *Cub* wings, 'Craft tails and Aeronca props. All too easily one takes things easy—and gets away three hours after sunrise just as the bumps begin. Already, you are worried about making time. By contrast, the air camper turns in soon after dark, is waked up by the sun, cranks up the ship and makes his first landing for gas, breakfast, shave and shower some 150 miles up the airway when other tourists just begin to stir.

Now, camping is as messy or as pleas-

Excellent for air camping would be the tree-bordered pasture in the upper right hand corner of the photo above.

ant, as fatiguing or as restful as you make it. Air camping is no exception. You must know how to go about it—and you need the proper equipment. Your bedding need not cut much into your luggage allowance. Take out your ship's cushions, use your blankets instead, and you get a seat almost as comfortable and but little heavier. How much bedding you need depends on the season and the region. In the east, it is dampness you want to guard against. In the west it is sharp nightly drop in temperature (as much as 50°). How much your bedding will weigh depends on the price you are willing to pay. The lighter, the more expensive. The best warmth-to-weight-to-price ratio is found in sleeping bags; mine weighs 7.5 pounds, cost $15 and is warm enough for 40°. As every bum knows, the main trick in camping is to be well insulated from the ground. How much covering you heap on top of yourself is less important. The best insulation is an inflatable rubber mattress. But these are easily punctured and inexpensive ones are hard to repair; a repairable one costs some $10 and weighs about seven pounds. But a scraped-together bed of hay, boughs or what-not will do almost as well. In a pinch, I have slept on my aeronautical maps and—again as every bum knows—a Sunday paper is very effective.

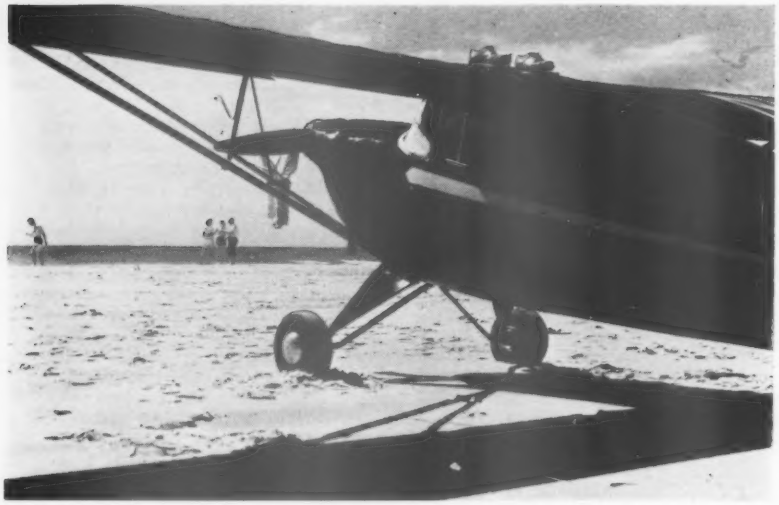
Don't bother with campfires. People who build fires are unwelcome almost everywhere. Then, too, fires are too much bother. If you want one for companionship or for cooking, put it out before turning in, else you will be fussing all night. If you do your camping right you won't need it.

As for mosquitoes, snakes and other hazards-in-the-grass, they seem terrible when you sit in an office and think about them, but you forget about them once on your trip. Should they pester you, a bottle of citronella will fix them.

You need protection from the wind. In ordinary camping, one usually picks a secluded spot. The air camper, by contrast, will want to be near his ship and that usually means a flat, open place where the wind blows. The wind is not only chilly; it also keeps you awake. A tent would be too heavy and too much fuss to put up and stow away. To sleep inside the ship is extremely uncomfortable. But if you go about it right you can use your own ship as a shelter just the same.

After much experimentation the best system seems to be as follows: Stake your ship down, tail into the wind, stick pushed forward, flippers pointing downward. Take a blanket or a piece of canvas and lay it atop the horizontal tail surfaces. You can fasten it there in some ships by stuffing it

Best section of beach for plane landings is the "wash" near water's edge to left of auto.



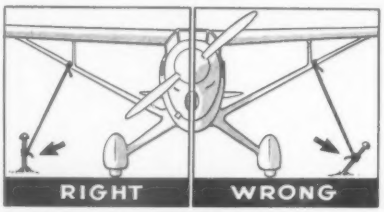
The Coast Guard will investigate any airplane down on the beach, so land your ship near their station and advise them of your plans. Beach landings are easiest to make.

into the gap between stabilizer and flipper, in other ships by using a bit of string and perhaps a clothespin. Let it hang down from the trailing edge of the flipper to the ground and spread what is left of it on the ground underneath the horizontal tail surfaces. Thus you have a roof (the horizontal tail surfaces), a windward wall (the part of the blanket that hangs down to the ground), and floor or mattress (the part of the blanket that is spread out on the ground). In combination, they make a cavelike tent in which you can sleep comfortably, head under the flippers, feet pointing toward the ship's nose. If it is cold or windy one can easily arrange sidewalls (see illustration).

If you want to sleep well stake your ship down well. Else you will worry all night about possible squalls and, in case one really comes, you can't seek refuge inside the ship or some other shelter such as a nearby farm porch, but must frantically try to improve on your stake-down job in the darkness. If you have never hung on to a lightplane in a thundersquall you probably haven't the proper respect for the tremendous forces that can develop—especially if the wind shifts and catches the ship from the front or the side. The wind usually does shift when it starts blowing hard.

For a good stake-down job use insulated electric wire rather than rope, because rope shrinks when wet and becomes too taut and therefore can't be set taut enough when dry. A ship tied so loosely that it can sway will jerk itself free in no time at all. Carry your own steel stakes (15 cents each, weight five ounces each) and preferably a camping axe to drive them with (a 2-pound one costs about $2). Don't drive your stakes at a sharp angle to the rope it is supposed to hold down (Fig. 2), but like a circus man when he drives tent stakes. That is, in almost straight prolongation of the rope. (Figure 3.) The wrong way tends to allow the tugging of the rope to gradually widen the hole driven by the stake, thus loosening the stake. The right way, though it seems wrong at first glance, will hold better.

Now as to camping sites. The most pleasant are the Atlantic and Gulf Coast beaches. Long Island beaches are forbidden and, naturally, one doesn't land on public bathing beaches anywhere. That still leaves hundreds of miles of practically unfrequented coastline. The law as to landing there seems undefined. As long as pilots use good sense and good manners,



Here is how to stake down a plane.

it promises to remain undefined. It is *not* good manners to put the Coast Guard to any trouble; they will investigate an airplane down on the beach. Therefore it is best to land near a Coast Guard station. This also has the advantage that you can get up-to-date weather reports there and you will find the station itself, its men, its duties and its tales an interesting place. Beach landings are easy. The hardest, smoothest place is usually "the wash"—the still-dark sand at the water's edge that has just been lapped by the waves. If you can, plan to land during low tide as the wash will be broader.

In addition, observe a few precautions. The wash naturally slopes down toward the water. How steeply it slopes is impossible to see until you are practically touching your wheels to it. Therefore "drag" your selected spot carefully, ready to gun the ship away should it be too steep. The wind will almost always be cross. Fortunately the two evils, cross-wind and slope of the beach —tend to cancel out each other. An airplane rolling on a side-hill wants to turn uphill with considerable force. In this case, it wants to turn away from the water. The local wind at low altitude on the beach *usually* is from the sea, blowing toward land. It will tend to turn the airplane toward the water. Also, your tail wheel will dig in and bring you to a short stop. But if the wind should blow from the land toward the sea, *beware*, for the slope of the beach and the wind will combine to ground-loop you into the dunes.

A ship down on the wash is exposed to salt mist and possibly to flood tide. On some beaches you can taxi well away from the water. Others are subdivided longitudinally by fences designed to stop sand drift and you can't taxi across. To land on one of the strips farther away from the water is risky, unless automobile tracks definitely show that the sand is hard. Otherwise it is better to land on the wash, investigate on foot and then fly the ship over for the night.

Stakes won't hold in the soft sand. If you plan a beach landing get three sacks from your grocer and use them, filled with sand, as anchors for your tie-down wires.

Good air camping can be had on farms. Fall is the best season, because the stubble fields offer good surfaces and there are no crops to damage. For the beginner, there is considerable mental hazard in a farm landing. But since he has his engine and can go around again or pick another field, there should be no real risk. The real risk comes in the take-off. The field may be softer than you thought, or in more of a dell. Or the wind may shift and force a take-off toward obstructions. Think of these things when you pick your field and, if caught in a doubtful situation, make a trial take-off first without luggage, passengers and unnecessary gas to see how it works.

In farm landings you trespass on private property first and can ask permission only afterwards. You'll find, though, that you needn't do much explaining. Of late, the public has come to know about "air flivvers" and the farmer will probably consider your air camping trip much less extraordinary than you consider it yourself.

Out west, you can often camp on entirely uncultivated land that is used only as a cattle range. But in the southern, dry

(*Continued on page 66*)

A blanket over the horizontal stabilizer, and a sleeping bag, are ample protection for the camper.

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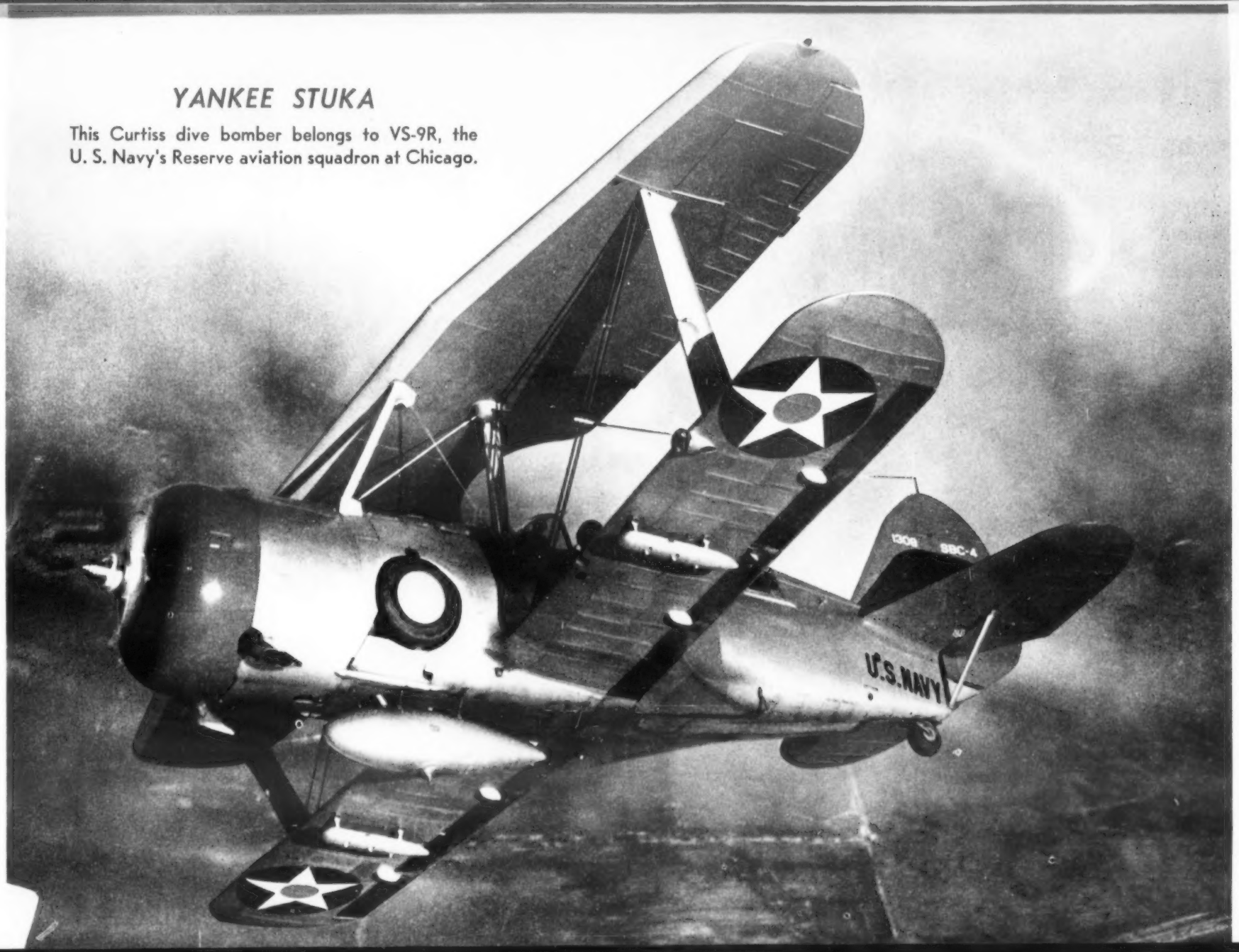
YANKEE STUKA

This Curtiss dive bomber belongs to VS-9R, the U. S. Navy's Reserve aviation squadron at Chicago.



THE DIRIGIBLE IS DEAD!

by LIEUT.-COL. KARL S. AXTATER
and RICHARD G. HUBLER

The disasters that wrecked the Navy's huge "Akron" and the "Macon" (above) spelled doom for U. S. dirigibles.

A lighter-than-air pioneer writes his farewell to the blimps and tells why he believes the airplane will continue to have aviation to itself.

Lieutenant-Colonel Axtater.

THREE years ago the dirigible *Hindenburg's* shroud of blazing hydrogen destroyed 36 lives and a $3,000,000 airship. It charred the hopes of nearly every lighter-than-air enthusiast, climaxing as it did a long series of American dirigible accidents—half the world total since 1912, taking the lives of 180 civilians and enlisted men.

But nowadays an aerostatic phoenix haunts the War Department. The giant flying cigars are coming in for a significant amount of gossip. Army and Navy officials are chatting seriously about the chances of reviving the rigids for possible war use. The traditional publicity smokescreen is being laid down by old faithfuls such as Lieut.-Commander Charles E. Rosendahl of the Navy. In Congress the House Naval Appropriations Committee produced a bill sponsored by Chairman Carl Vinson to build "not more than" 36 airships for use in the current national defense program.

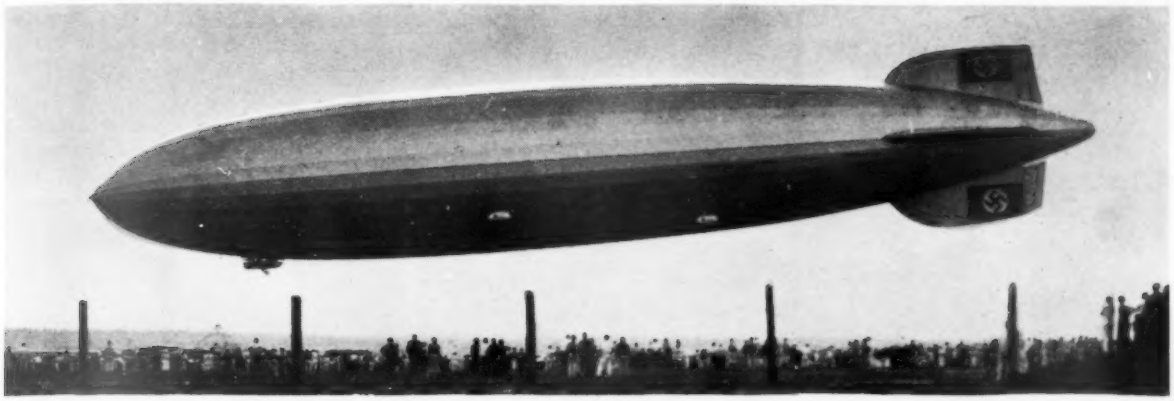
This is the fattest lighter-than-air pork pie ever produced in peacetime. It seems ironical that the number of airships proposed is exactly the number of *Hindenburg* dead. I am one of four men in the Army, one of less than a dozen in both services and the United States, with training and experience to handle a dirigible. I have to my credit more than 2,000 hours in airships, 600 hours in free balloon flights and over 500 in captive balloons, in my 23 years of service in the Army Air Corps. Having commanded and flown virtually every type of airship in war and peace, both afire and awash, for pastime, profit and duty, I feel qualified to say:

"The dirigible is dead! Long live heavier-than-aircraft!"

The original justification for building super-airships of the mammoth ilk of the *Akron, Shenandoah* and *Macon* lay in their superior range and payload, their aerostatic factor of safety, ability to keep a schedule and their comfort. The *Hindenburg,* to take the most notable, had a cruising range of approximately 6,000 miles and could carry from 35 to 40 per cent of its own weight of 220 tons while keeping a 95 per cent perfect schedule, even over the storm-ridden Atlantic.

As late as 1935, parallel development of the airplane was almost unheard of and generally unthinkable to all but the most sanguine researchers in aerodynamics. Prof. Claude Dornier's authoritative dictum was an air engineering classic. Not an airship could expect ever to rise above a weight of between 50 and 60 tons. Seversky and Sikorsky, twin genii of American aircraft builders, were publicly doubtful about constructing engines to hold up under the heat of long, speedy hops. And, in those days, passengers could be squeezed in only between the pistons and exhaust pipe.

Today the B-19 Army bomber is the newest baby of aeronautical engineers. It has, at birth in the Douglas factory, a weight of some 70 tons and can carry a payload of approximately 28 tons. This ship is cap-



"It is the maddening thoroughness in one of the most exacting professions in the world that makes me almost certain that the 'Hindenburg' disaster was the result of sabotage rather than accident."

able of cruising over 6,000 miles at 185 miles per hour. It has four air-cooled, 2,000 h.p. engines—a total power that exceeds that of most locomotive engines. Its sponsors have assembled it to secure further factual data on big ships. Plans have already been made to start blueprinting a 100-tonner.

As for comfort the great 42-ton transoceanic Clippers have the luxuries of a city hotel: sizzling meals, hot and cold water, spacious seven-foot beds, miniature lounges. They are able to carry and sleep 48 passengers and a crew of nine—as compared to the *Hindenburg's* 72-person capacity. But that advantage of the dirigible, soon to be removed by increased plane size and streamlining, is the sole remaining one of the airship over the airplane in peace or war.

In all other respects the plane is vastly superior. It commands over three times the speed of dirigibles. The largest can fly at 200 m.p.h. (as against 60) with many more m.p.h. vitamins in reserve.

I have flown dirigibles in moderate headwinds where the big bag was actually blown backward. This defect is responsible for most of the dirigible disasters that shocked the public back in the 1920's and '30's. The storms that wrecked the *Shenandoah* in Ohio with the loss of 14 souls, the *Akron* off the coast of New Jersey with 73 lost, including Rear Admiral W. A. Moffett, chief of aviation; and the *Macon* with two more in the Pacific—twisting steel girders into curley-cues, ripping rubberized fabric into hanks of frayed and torn thread—these gales were encountered simply because the big ships didn't have the speed to run away from or dodge them. Acts of God excepted, an airplane can always duck around a meteorological disturbance; even cyclones move at the relative snail's-pace of 20 m.p.h.

Another factor that buried the dirigible —and should have deterred Congressmen that want to see lighter-than-air ghosts hover again—was their staggering cost. Dirigibles demand a tremendous initial outlay. In 1929, the cost of building a Zeppelin *dock* at Akron, O., was $2,000,000. Then came the costs of the *ships* built there—fabric and girders, labor and design —a total of $4,000,000 apiece for the *Akron* and *Macon*. Added to this was the running cost of helium gas to inflate the rigid—$25,000 for the initial 2,148,000 cubic feet contained in such a ship as the *Shenandoah*, thousands more for replacing the weekly leakage of the precious, non-inflammable stuff. To this must be added the staggering amount of salaries for personnel. No one has estimated the exact amount it cost to hire men to nurse the ill-fated dirigibles that the United States has experimented with, but it is safe to say that for the crew of nine men required to fly a big airplane and the ground crew of 10 needed to keep it up (Army estimates), at least 45 to 60 are needed aboard the dirigible with hundreds more in the permanent ground crew.

The training of the dirigible personnel is no mean item and it accounts for the scarcity of capable rigid airship men today. It started almost when I did—back in May, 1917, with a student flight in a free balloon at St. Louis under the auspices of the Missouri Aeronautical Society. For a month I sweated to learn everything there was about free lighter-than-air flying and took my solo. As I landed from that first flight alone, some bearded Missourian with a lighted cigar cocked in one corner of his mouth strolled toward me. He got too close. The escaping hydrogen poofed skyward in flames. I got out safely but though I searched for him with a burning yen to scorch his whiskers, I never managed to find him.

I flew in the Toul sector during the World War, doing observation work from cable-captive balloons, notching up five months on the front without relief—sometimes doing as much as 19 hours straight duty. I came back to the United States in 1920 and up until a few years ago was intensely interested in the future of airships. When I became convinced that science had blighted the future of dirigibles, I swung over to the ranks of the airplane addicts. It made me realize the difference between the time element of airplane training and dirigible work. In the former field, five to ten years will make an expert out of a flyer —less than that today with the defense program under full swing. For the latter, no less than 15 to 20 years is required.

In the Army, a man may become an airplane pilot after only a cursory apprenticeship in dungarees. The dirigible man must start from the greasemonkey stage and finally achieve skill enough to be practically able to build a dirigible himself out of old inner tubes and a Meccano set before he is judged passable. Nor does this include knowledge of ship trimming, navigation, steering and sky generalship.

It is this maddening thoroughness in one of the most exacting professions in the world that makes me almost certain the *Hindenburg* disaster was the result of sabotage rather than lightning or accident. The Germans who flew that gigantic airship knew their job with unimaginable perfection. They just didn't make mistakes. Capt. Ernst Lehmann, who commanded her on the last flight, groaned while he lay on his deathbed in the hospital: "I don't see how it could have happened." He repeated it over and over like a litany. He was right. It couldn't have happened. According to reports, the fire started in the tail of the airship—"a sudden streak of blue flame ran down the tail surfaces, then the ship exploded." Nearly all the eyewitnesses and camera accounts agree on this.

Here's the catch: hydrogen never explodes like that. A single spark and it blows sky high. There's no interval; just the boom. If you recall, the *Hindenburg* had made a quick trip on her first 1937 flight—which was to prove the last of all time—and was forced to hover for some time in the rain before it landed. For my money, the explosion was caused by a time bomb, planted to detonate over the Atlantic near our shores. There is no other explanation to the men who knew the Germans and their thoroughgoing genius in Zeppelin work. What makes this "slow-fuse" blast more puzzling is the fact that any hydrogen filled airship cell contains a highly explosive mixture—hydrogen and air at the end of a long trip. It is caused by the pumping of the rubber walls.

For air travelers and those interested in the well-being of our air fighting forces, this suggests the question of the relative safety of these two branches of the Air Corps. With helium supplanting hydrogen and eliminating the fire hazard, the only outstanding dangers to a dirigible are from storm or motor failure.

Storms are accepted by airship commanders with stoical fatalism. If they come, they will try to ride them out. I remember one night flight in an Army non-rigid balloon in the mid-west. On that night

(*Continued on page* 58)

Canada Supplies the Pilots

by James Montagnes

Britain's Royal Air Force is banking heavily on the pilot-training program now under way at dozens of new Canadian air bases.

Air gunners practice at a Canadian gunnery school.

TRAINING of pilots, observers, air gunners and ground crews for the British Empire has been speeded up in Canada, so much so that the entire British Commonwealth Air Training Plan now is a year ahead of schedule. By the end of 1940 all of the 80-odd air fields for the training scheme will have been completed, a project which was scheduled to be completed by the beginning of 1942, when the training plan was first announced last December by Prime Minister W. L. M. King at Ottawa.

Brought about by the speed of the war in Europe, the air training plan has been rushed, while at the same time Great Britain's contribution of airplanes has by circumstances been changed. Instead of Canada receiving 1,600 Avro *Anson* bombers and other planes for training purposes from factories in England, Canada has sent back what planes have arrived from England and gone into production of *Ansons* in Canada, the first of which are expected to roll from Canadian aircraft factories by March 1941. A Canadian government corporation,

After a four weeks' course at one of the initial training schools, the prospective warbird is sent to one of 26 elementary flying schools. Trainer in background (above) is North American "Harvard."

Federal Aircraft Limited, has been given the job of producing these planes—one of six standard types being used in training the warbirds of Great Britain, Canada, Australia and New Zealand in a joint scheme functioning mainly in Canada under the Royal Canadian Air Force.

Canada was chosen for the job of training the Empire's warbirds because of her proximity to Great Britain and the war zone and because her vast areas were ideally located for training airmen summer and winter. No overcrowding is possible in the Dominion and the 71 schools set up for training the future air fighters of the Empire are located from the Atlantic to the Pacific, with the bulk in the central part of the country.

As a result of the speed-up in the plan the Dominion has been divided into four air training commands, each of which is self-contained and can turn out air fighters ready for immediate service in the war zone. The Number 1 Training Command is in the highly industrialized region of southern Ontario, bordering on the Great Lakes, with headquarters at Toronto. Number 2 Training Command, with headquarters at Winnipeg, comprises western Ontario. Manitoba and most of Saskatchewan. Number 3 Training Command is all of eastern Canada from the Quebec-Ontario boundary east, and has command headquarters at Montreal. The Fourth Training Command consists of British Columbia, Alberta and southern Saskatchewan, with headquarters at Regina.

Each training command has a number of recruiting centers in principal cities. From the recruiting centers the recruits are sent to one of three manning depots, at Ottawa, Toronto and Brandon, Man., where they are outfitted and given elementary instruction into the life of the Royal Canadian Air Force. Here they are also divided into categories for service. Stay at the manning pools seldom takes more than two weeks. From there, the recruit going into an aircrew is sent to one of three initial training schools at Regina, Toronto or Montreal. Recruits for administrative or ground crews are sent to other schools.

After a four weeks' course at one of the initial training schools the prospective warbird is sent either to one of 26 elementary flying schools, if he has been picked as a future pilot; to one of 10 air observers' schools if he is to be an observer or to one of four wireless schools if he is to be an air gunner and wireless operator. The pilot advances after a seven week course at the elementary flying school to a service flying school for an intermediate training squadron course of seven weeks and to advanced training squadron for five weeks. Then follows a two-weeks course in bombing and gunnery, there the recruit is ready, after 25 weeks, to be the pilot of a fighting, bombing or reconnaissance plane.

The air observer takes a 12-week course in navigation, reconnaissance and photography as the second step on the road to becoming a member of an aircrew. He gets six weeks at the bombing and gunnery school and four weeks at an air navigation

One of the most popular advanced trainers in Canada and England is the North American "Harvard," which is similar to U. S. Army's BC-1. Ships above are in Canada.

school. After 26 weeks he is ready for overseas active service. The air gunner and wireless operator spends 18 weeks of his course at the wireless school, gets four weeks at the bombing and gunnery schools and, in 26 weeks, is ready to try his marksmanship on the Germans. All graduates of the air training plan emerge with the rank of sergeant pilot.

Each training command has its own repair and equipment depots. To staff these depots, recruits are trained at the Technical Training School at St. Thomas, Ont., and at the Aircraft Inspectors' School at Toronto. At the Aeronautical Engineering School at Montreal, officers to take charge of maintenance operations are trained. Administrative officers and men receive training at the School of Administration at Trenton, Ont., and at the Equipment and Accounting Training School at St. Thomas, Ont. To meet the special medical needs of the airforce, in addition to the services supplied by the Royal Canadian Army Medical Corps and the Canadian Dental Corps, there is a school of Aviation Medicine at Ottawa where medical officers are trained in special aviation medicine.

First fully trained airmen under the British Empire Air Training Plan were graduated from the various schools this summer. By September 3,500 pilots, air gunners and observers were in training, according to a statement by James S. Duncan, deputy minister of defence for air. How many men will graduate annually when all the schools get into full operation is not divulged, being considered a fact of value to the enemy if announced.

Biggest task has been to build the ground facilities for all the 71 schools. At war's outbreak Canada was equipped with a number of Royal Canadian Air Force training depots, with a newly organized government-owned transcontinental airway — Trans-Canada Airlines—which has emergency flying fields from coast to coast, and with the fields of flying clubs and commercial flying schools and aircraft manufacturers. The problem to co-ordinate all these fields into airports for training warbirds had to be solved. It was decided to train as near to large cities as possible, to allow the 22 light airplane clubs and a number of commercial flying schools to teach elementary flying to would-be pilots and to let commercial flying schools teach air observation. From then on the flying schools became those operated by the Royal Canadian Air Force. The air force has liaison officers at each of the private flying schools.

An idea of the work involved in getting the airfields alone into readiness for the scheme can be seen from what was felt to be necessary for the 16 service flying training schools, the schools to which pilots are sent after passing through the elementary schools. In addition to the fields at which the schools are based, it was decided that there be emergency flying fields within a five to 25 mile radius of each of these 16 schools necessitating construction of numerous fields, some of which had to be cut out of virgin forest, then graded, fenced, lighted and equipped for training purposes. Water and electric power had also to be supplied these fields. The main airport and the two relief fields are of the same size, with grass runways 3,000 feet long and 750 feet wide, and two hard-surface runways 2,500 feet long and 100 feet wide. Each school has a building area of 45 acres. Each field is equipped to handle 60 planes in constant operation at the same time.

All this airport work had to be done also to a number of the elementary flying schools and the more advanced schools, while buildings had to be put up at practically every school to take care of the vast instructional and training staff. Housing and messing facilities had to be provided as well. All this was pushed ahead so that by the end of 1940, instead of early in 1942 as originally planned, all the schools would be in readiness to take their full quota of trainees.

The government supplies the private flying schools with buildings, airfields and airplanes. Canadian-built Fleet *Finch* and de Havilland *Tiger Moth* airplanes are used at the elementary training schools. Canadian and British-built Avro *Anson* and Canadian and United States-built North American *Harvard* planes are used for pilot instruction at the service flying schools. *Ansons* also are used at the air observers' and air navigation schools. At the Royal Canadian Air Force advanced flying, bombing, gunnery and air armament schools, British-built and Canadian-assembled Fairey *Battle* aircraft are used. Canadian-designed Noorduyn *Norseman* airplanes are in use at the wireless and air navigation schools. In addition, other aircraft such as the Airspeed *Oxford*, Lockheed *Hudson*, Boeing 247-D, Douglas *Digby*, Westland *Lysander*, Vickers-Supermarine *Stranraer*

(*Continued on page* 68)

Below is a typical Canadian training base. Planes that can be seen in this picture are "Harvards," Fleets, Avro "Ansons," a Lockheed "Electra" and Fairey "Battles." Old U. S. airliners are trainers.

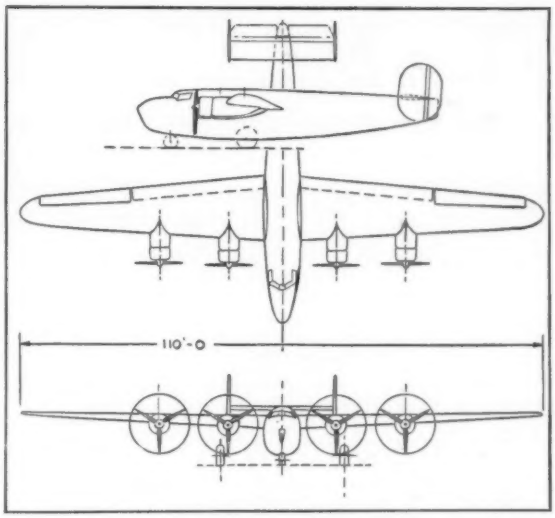
Whopper

The B-24, technically Consolidated's Model 32, has four air-cooled engines totalling about 5,000 h.p.

An export version of the B-24 is being built in large quantities for the British R.A.F.

DEADLIEST long-range heavy bomber now being built for the U.S. Army Air Corps is not the much-touted Douglas B-19 that has the Sunday supplements gasping, but the ungainly-looking Consolidated B-24 pictured on this page. The B-24 and its many new developments, both secret and public, is expected to do for our military air strength what the Boeing *Flying Fortress* did several years ago. Fully loaded the B-24 weighs 41,000 pounds; with its crew of from six to nine it is said to have a loaded range of some 4,000 miles which is almost 50 per cent better than anything flying today. Notable innovations are the B-24's tricycle gear and radical wing (see "Mystery Airfoil," June, 1940)

Retractable landing gear makes B-24 well-streamlined in flight. But conspicuous in picture below is relatively large frontal area presented by radial engines; in-the-wing engines would be ideal.



Three-view drawing of B-24 shows relative narrowness of the wing to rest of the ship. A gun emplacement is between rudders.

Upon delivery in French Morocco, the 167F's were assembled by Martin engineers and tested briefly.

Overseas Mission

by John C. A. Watkins

This is an exclusive interview with a Martin test pilot who accompanied the American-built bombers delivered to the late French air force.

HIGH over the orderly little brown and green fields of France, the Messerschmitt Me-109 idled along through patches of scattered clouds. The noble young Aryan loafing in the cockpit glanced casually over the side toward the earth, looked away, then snapped to attention and peered intently downward. Thousands of feet below him a camouflaged twin-engined bomber with the French air army insignia roared toward Germany on a mission of its own. Hitler's obedient little minion kicked his left rudder pedal hard over, shoved his stick forward and the Nazi pursuit plane hurtled down in a screaming dive. Flattening out a few thousand feet behind his prey, the German opened up with his guns The rear gunner in the French ship replied, but the gap between the German fighter and the French bomber began to widen and continued to widen even though the Nazi pilot opened his throttle until the engine was shuddering at the heavy load. For three or four minutes the chase kept up, but the Frenchman still drew away.

Finally the German engine, fed by poor quality gasoline and lubricated by inferior oil, gave up. Clattering and smoking, it threatened to catch fire and the young pilot forgot his prey of a few minutes before and looked for a landing place in one of those same little orderly French fields to which he had been paying no attention just a short time ago.

That, according to stories told by French pilots to a group of American assembly experts at Casablanca, French Morocco, was a fairly typical experience of the Frenchmen who flew Martin attack bombers. Ellis D. Shannon, who headed the assembly crew, is a Martin test pilot and engineer. Like all engineers, he will not personally vouch for the story because he wasn't there with his slide rule and stop watch to check it, but it's a typical tale of the superiority (in most respects) of American fighting craft over those generally used in Europe's great conflict.

Shannon and his gang had been in Casablanca only a short time when French officials, who had run exhaustive tests on captured Messerschmitts, informed him that the Martin attack bomber would outrun the German fighter. They gave no more details than that, but not long afterward, pilots coming to French Morocco to ferry the Martins to France began relating such incidents. Their fellows, they said, would trick German pursuit pilots into wide-open chases of the Martins, which frequently ended with the German craft's engine burning up while the Martin, powered with American engines operating on high quality fuels, got away with very little, if any, damage because of the unusual strain.

Below is Ellis D. Shannon just before leaving the U. S. with a shipment of Martins.

Shannon and 19 other Martin men left the United States last December 12 by air and eight by steamship, to supervise the assembly of the Martin attack bombers which even then were pouring across the Atlantic in a steady stream. The French Potez organization, aircraft manufacturers, had a contract with the Government actually to assemble the American bombers. Plans had been made to assemble the ships in France proper, Shannon said on his return to Baltimore after the French surrender, but these were changed suddenly by the Air Ministry and Casablanca was designated as the assembly point.

"We spent about two weeks in Lisbon," Shannon related. "What was actually happening was that they were either deciding where the assembly base was to be located or they had decided that we were being followed. We finally reached Casablanca

The French used their Martins constantly during heavy fighting with practically no maintenance. One squadron of 167F's performed eight missions in 24 hours without losing a single airplane.

on December 27 and found approximately 800 crates (containing about 100 airplanes) waiting for us. We thought that was certainly a dangerous thing, because all those huge crates out there made a wonderful target. Even a small force attacking Casablanca could have destroyed the whole group. It happened, however, that there wasn't a single air raid from the time we arrived until France surrendered and we left."

Shannon said the assembly problem at the remote African port was terrific. He and his colleagues had worked out their plans, based on Martin assembly experience all over the world, on the assumption that spare parts and other supplies would be available not more than a hundred miles or so away. At Casablanca, however, they were practically isolated. As he put it: "If we wanted a certain type screw, there wasn't any five-and-ten-cent store downtown to go to to get it."

Nevertheless, hangars and shops were erected, native labor was obtained to as great an extent as possible and the work of assembling the American-built bombers as fast as they arrived in convoys of freighters was undertaken. It is a triumph of the French and British navies that not one ship was lost en route and to the American engineers that they were assembling the aircraft as fast as they arrived and that not a single bomber was lost through carelessness or damage en route.

"Several things impressed the French most," Shannon said when asked their reaction to the Martin bomber. "One was that they would go without too much maintenance. That is, with practically no attention they could use the ships almost constantly during the heavy fighting. We were told that one squadron performed eight missions in 24 hours without the loss of a single ship, although members of their crews were killed and wounded. One ship, they said, came back with the whole front end practically blown off by an anti-aircraft shell and the bombardier, of course, was killed. It was a miracle it didn't get the pilot.

"They were tickled pink with the performance. The very first reports we had were that flying at low altitudes, they weren't afraid of the Messerschmitts because they could run away from them. They said that after a few minutes the German engines would burn up. I can't personally vouch for that, of course, but I did hear that the Germans were using low octane gasoline."

Shannon, who was supposed to test-fly each ship after it had been assembled, said that some of the Martins were kept in Casablanca to protect the assembly base, others were sent to Syria and various other French possessions in Africa and the Near East, but that the major portion were flown across the Mediterranean to Marseille and from there assigned to various squadrons throughout France. Several hundred were reported to have been in action—although he will not discuss the quantity—when France surrendered. Shannon says that "many of the ships were flown back to Africa from France during the period of negotiations with the Germans." None came to Casablanca, he said, but they were told that the ships were being flown out of reach of the conquering Nazis.

One thing that impressed the French was the ability of the American aircraft to function in almost any manner. They were used for long-range reconnaisance, as bombers, attack planes and as fighters. In the latter guise they were very effective, having forward-firing machine guns and being highly maneuverable.

"We set aside a few ships to act as fighters in case enemy ships showed up at Casablanca," Shannon commented, remarking that the French air force at the important African port was small and antiquated, "but none ever did. We didn't see a German or Italian airplane in all the time we were there." Apparently the heroic Italian airmen, who had bases within comparatively easy reach, had no stomach for whatever might have been waiting for them at Casablanca, although it would appear that with that port the principal assembly point for the American built warplanes purchased by France, it would be highly desirable to put it out of business.

Shannon had several amusing tales to tell, all relayed to him by the French officers who came over from the continent to take the Martins back. He heard that early in the war, when the Martins first went into action and were not well-known on the

(*Continued on page* 83)

Specialists in the

The civilian entering the Air Corps can master any trade including engine maintenance, aircraft construction, photography and meteorology

MRS. BLANK, mother of that boy who joined the Air Corps some time ago, was pretty well confused. Here she had been telling the neighbors in all good faith that her son was working on airplanes, but now he was home on furlough talking the family's head off about his job. Did he fly? Sure he flew; that is sometimes and as a side activity when he went over to the hangar line. His *real* job was running a crash boat. His pal was a clerk in headquarters and another fellow he went around with operated a Link Trainer. More explanations.

"Well, my goodness," said Ma, "doesn't *anyone* work on the airplanes themselves?"

Yes, they do, a lot of them do, but not everyone directly. The Air Corps, being a big organization of many divisions and different activities, has many highly specialized workers who are the men *behind* the men *inside* the airplanes. Even the men inside the planes have their specialties.

Let's take the pilots themselves, practically all officers. Likewise practically all Air Corps officers are pilots. They usually specialize in one type of aviation so far as combat piloting duties are concerned. From Kelly Field the newly winged pilot starts in bombardment, let us say, and grows up as a member of one bombardment squadron or group after another. Heretofore flying has not been their sole specialty, however. Some are also engineering experts at the materiel division at Wright Field or as engineering officers of combat squadrons or air bases. Among its officer personnel the Air Corps has experts in personnel, military intelligence, operations, supply, communications, armament and meteorology to mention only a few specialties. Too much specialization is not always desirable in the officers; the commissioned officer should have a broad experience that fits him for eventual command of a large force of the combined types of aircraft. That is the desirable situation, but military authorities realize that nearly every flying officer sooner or later takes an interest in some particular ground specialty and becomes unusually proficient therein.

Co-ordinating his specialty with his flying and with the other activities of his outfit gives him a good insight into the general operation of his outfit; of what makes the wheels go around in it. There was also the Air Corps Tactical School, recently inactivated where officers with all sort of experience were taught the tactics and the problems of commanders and staff officers of all types of units, air and ground. At present a new phase of specialization is arising in the Air Corps among its officers. The GHQ Air Force is approaching wartime strength and organization. In time of war most of the officers in a bombardment squadron would have flying duties only with a small squadron staff supervising its mess, administration, operations, supply and technical activities. The term "flying duties only" does not quite describe the responsibilities of the bombing plane's combat crew and the importance of their duties.

"The combat crew is composed of specialists," states Major Harold L. George, who commands the Second Bombardment Group of *Flying Fortresses*. "There is an airplane commander, a co-pilot, a navigator, a bombardier and several engineer-gunners and radio-gunners. The training of these specialists and then the welding of all into a proficient military unit takes long and arduous training. It is not a matter of a few months and *it cannot be accomplished as a part-time job.*"

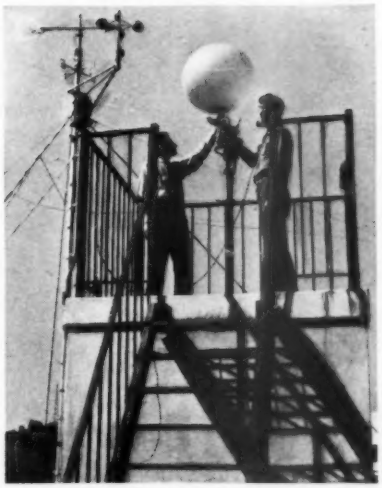
So here we see specialization in the form of combat crews. At first glance it seems that the individual in it has an easy and routine job, but a combat crew as individuals and as a team can never be too well trained. When the members are well trained as a *single* team there is always the training of that combat crew as part of a flight or squadron team. The Air Corps recently has opened a school in Miami for non-pilot aerial navigators and intends to train several hundred men there. It is also training meteorological cadets at five universities.

AIR CORPS

by

MAJOR ROLAND BIRNN

There are many well-paying trades awaiting the average young American in the Army Air Corps. This technical training is the world's finest.



Army meteorological training covers radio, forecasting and drawing of weather maps.

Among the enlisted men is where we find the great majority of its specialists. Not that many of them are not versatile and effective in their versatility. Master Sergeant Floyd B. Haney of the Second Bombardment Group is a good example. The author knew him in 1923 in Panama when he was "N.C.O. in charge" of the Aero Repair Hangar. Later at Bolling Field he was in Air Corps Supply and still later an aircraft engine mechanic, then line chief and now group technical inspector, a job for which he is fitted because of his broad experience. He is also a qualified basic aerial bombardier. Practically all of the Air Corps master sergeants and many of the technical sergeants are proficient in more than one specialty, having become so during their years of service and changes of station. This versatility stands them in good stead as executives which they are expected to be by the time they have reached the higher grades, supervising the work of a large number of craftsmen of varied specialties.

Considerable thought has been given to the job of crew chief in the Air Corps. There has been some contention that this job is too wide in scope, requiring a man manually competent in too many specialties and that all airplanes in a squadron should be pooled with many specialists each responsible for the proper functioning of his department in every airplane in the squadron. However, there is still much virtue in the present system of having a crew chief responsible for one complete airplane. A good idea of the mechanical specialties found in the Air Corps may be seen in the list of examinations given to candidates for air mechanic rating. They are:

Armament: Aircraft armorer; bombsight mechanic.

Aircraft: Airplane mechanic; airplane engine mechanic; balloon mechanic to include—balloon maneuvering, rigger, balloon fabric worker, cordage worker; propeller mechanic; instrument mechanic; electrical mechanic; carburetor mechanic; sheet metal worker; welder; machinist; woodworker; dope and fabric worker; gas worker; operator, balloon winch and motor windlass equipment.

Communications: Aircraft radio operator and mechanic (tactical); station radio operator and mechanic; aircraft radio operators; teletype operator and mechanic; control tower operator.

Weather: Operator, weather service; radio operator, weather service.

Photography: Camera repairer; laboratory technician.

Miscellaneous: Link Trainer technician; parachute rigger; operator, crash boat—this examination to include gas engines, ignition and battery systems, and pilot rules.

The mechanical specialties are not the only ones found in the Air Corps. Clerical workers, cooks, weather men and many others have their place in the military scheme. Clerks may find their jobs further specialized into "clerical, administrative" and "clerical, technical." When the 23rd Composite Group was organized at Maxwell Field last year a number of clerks were needed for the new headquarters. Inspection of the service records revealed several former clerks in the group. Not that it helped the Group Adjutant any as it turned out they had all been clerks in meat markets or grocery stores. Many a quartermaster at a flying field is using former specialists of this type, handling groceries in one of the vast commissaries where food for hungry soldiers is stored and dispensed.

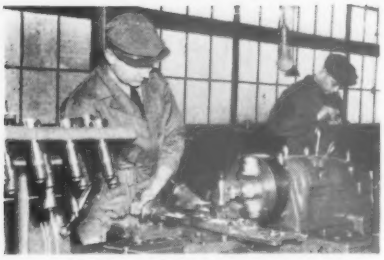
The question might arise: How much does a fellow have to know to qualify as a propeller mechanic or machinist or weather man, or whatever job he is interested in? For promotion to staff sergeant in the Air Corps weather service a weather man of a lower grade is required to pass an examination in mathematics through quadratics and logarithms; physics through mechanics and beat such as is given in the first year of college physics; meteorology including atmospheric stability and instability, air mass analysis, icing problems; movement and change in the structure of fronts and pressure systems; weather forecasting including practical exercises in analysis of atmospheric soundings and surface weather maps together with preparation of forecasts.

For promotion to technical or master sergeant ambitious weather men take examinations in meteorology and weather forecasting, but dispense with mathematics and physics. In their stead they take Army administration, supply and weather station operation and training. Duties and qualifications for several other trades include:

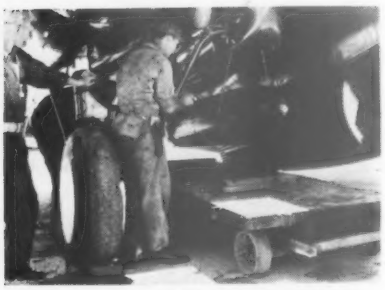
Experience in the operating of the Link Trainer is invaluable to the young soldier.

Propeller men in the Air Corps get practical experience on controllable-pitch props.

The airplane mechanic and specialists in aircraft construction learn their trade on the latest, most advanced types of ships.



The current national defense program has emphasized the need for expert machinists.



To those who want it, training also is available in air armament and munitions. Armorers (above) are loading a bomber.

Aerial cameraman (still camera): He takes aerial photographs for actual mapping and surveying; oblique and vertical photographs for stereo-photographs, reconnaissance and record work. Besides being experienced and skilled in the making of all types of aerial photographs he must be thoroughly familiar with the installation, operation and care of all types of aerial cameras and equipment and be able to make minor repairs. He should know enough mathematics to be able to work map problems and prepare flight maps.

Airplane engine mechanic: He overhauls, repairs, tests and maintains the standard types of aircraft engines. He should be a graduate of an engine mechanics' course in a recognized school or have the equivalent in experience in an engine manufacturing plant or general repair shop. He must be able to use the various hand and machine tools of the shop; be familiar with screw thread sizes; bearing fits and tolerances; have a thorough knowledge of engine construction principles and be capable of repairing, adjusting and maintaining engine parts and operating, testing and installing engines.

Machinist, general: He does any kind of general machinist work involving construction, assembly, bench or machine tool work. He must be a thoroughly experienced, all around, adaptable bench and machine hand on general machinist work and repairs; able to work from drawings, figure dimensions where required, lay out plain work and machine and finish to a fair degree of accuracy. He should have had experience on floor assembly or erecting or on repair of general machinery and in use of portable tools; should understand average milling-machine work and be a good general bench hand on chipping, filing, fitting, tapping and reaming with a knowledge of flat and bearing scraping, key seating, stud and bolt fitting.

Ability in some specialized line is financially recognized in the Air Corps in several ways. First there is the rating of "specialist" from sixth up to first class, given to privates and privates first class. In addition to their monthly base pay of $21 and $30 respectively, rated soldiers get extra pay of from $3 for specialist sixth class, $6 for fifth class, $15 for fourth class, $20 for third, $25 for second and $30 for a first-class specialist. An air mechanic's rating carries with it a base pay of $72 and $84 for second and first-class respectively.

Army regulations list over 200 specialties for which first to sixth class ratings may be given. Some—such as forester, laundry operative, horse trainer, saddler—do not apply to the Air Corps, but there are many that do. A few of these are: Armorer, blacksmith, blue printer, bookbinder, cabinetmaker, camera repairman, chauffeur, clerk, cook, developer, draftsman, electrician, fabric worker, machinist, airplane mechanic, airplane engine mechanic, automobile mechanic, carburetor mechanic, radio mechanic, messenger, radio operator, telephone operator.

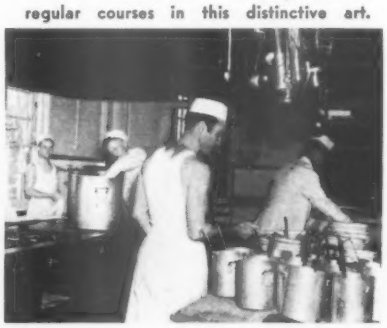
In general, these ratings are given for those jobs for which air mechanics ratings are not applicable, but the specialist ratings are a sort of junior rating to the higher paid air mechanics ratings. For instance, a soldier might be rated an aircraft engine mechanic, specialist sixth class and work up through the ratings until he reached that of first class specialist. About that time he would be going to the Air Corps Technical School to pursue the course in which he had already had some experience. On his return to his squadron and after passing the appropriate air mechanic's examination he would be rated as air mechanic second class, later air mechanic first class and perhaps up to sergeant while he held the air mechanic rating.

Straight promotion up through all grades to master sergeant generally comes with length of efficient service. Theoretically

Operations men and dispatchers are just as vital to the Air Corps as the airlines. Enlisted men specialize in this category.

The Army even trains airway traffic control men. As in other branches, these men can command good jobs in civilian life.

Yes, the cook is just as much a specialist as the radio man. The Army conducts regular courses in this distinctive art.



the ability to direct the work of subordinates brings promotion to and through the non-commissioned officer grades. Many corporals and sergeants are actually air mechanic specialists although not pay rated as such.

Another question which arises is how many Air Corps soldiers out of every hundred are other than buck privates with the beginner's pay of $21.00 monthly. From a bombardment group, picked at random, with three tactical squadrons, a group headquarters, headquarters squadron and with a present total enlisted strength of 840 men there are the following grades and rating:

29 master sergeants
4 first sergeants
21 technical sergeants
73 staff sergeants
45 sergeants, air mechanic, first class
20 sergeants, air mechanic, second class
30 sergeants with no ratings
28 corporals, air mechanic, second class
41 corporals, with no ratings
234 privates, first class
12 air mechanics, second class
36 specialists, second class
18 specialists, third class
20 specialists, fourth class
12 specialists, fifth class
40 specialists, sixth class
96 hold no rating
315 privates
23 air mechanics, second class
18 specialists, second class
10 specialists, third class
29 specialists, fourth class
25 specialists, fifth class
84 specialists, sixth class
126 hold no rating (about 100 of these are recruits).

From this it can readily be seen that the Army Air Corps offers many varied and diversified trades to the average enlisted man, provided that man is really interested in mastering a profession. That such opportunities are more important to the average man today than ever before is evidenced by the high demand for skilled workers in practically every branch of industry. In the majority of cases, the unemployed man today is the man who refused to, or didn't have the opportunity to learn a trade in his earlier years. The result is that he isn't able to offer the employer much today.

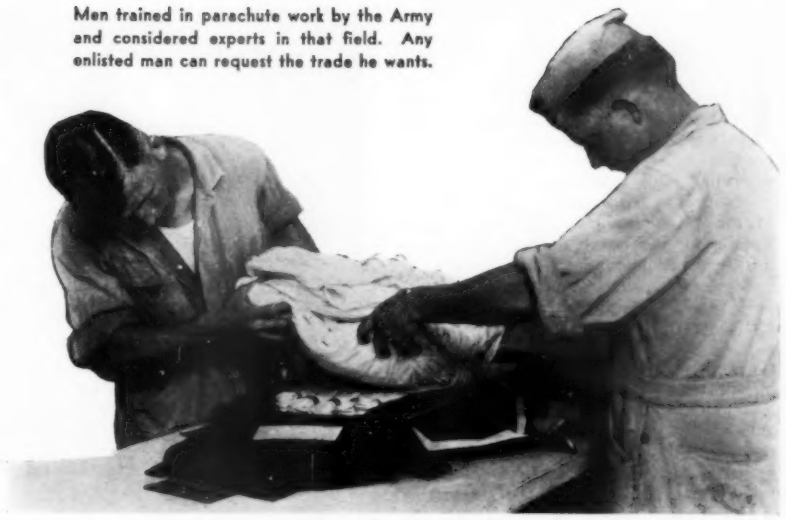
This article may, by its own subject matter, appear to ignore the commercial schools. This appears to be so only because we are dealing with the military field. Let there be no doubts about the excellence of civilian trade schools in aviation. By rights, they should not be compared with military schools; the Army primarily is concerned with the building up of our national defense system. Obviously, trained and experienced personnel is vitally important to such a program. The commercial schools—and this alone is proof of their excellence—already are working with the Army.

Someone always asks the question: What about the fellow who isn't a clerk and can't seem to master a trade, is there any hope for him in the Air Corps or is he destined for perpetual kitchen police? If he can handle men and proves it, he may find himself boosted up the line and carried as a duty corporal or duty sergeant. Lots of jobs come up in the Air Corps where all that is needed are enough men and someone to handle them. Like at recent maneuvers at Alpena, Mich., when half a dozen *Flying Fortresses* were to be backed up into the woods around the airport for rapid camouflaging. There was only one tractor available so about 80 soldiers grabbed a bomber and with their strong backs a-straining they ——. Strong backs? Yes sir, for all our specialization and mechanization there are times they come in handy, especially out in the field.

Note: Opinions expressed herein are those of the author and not necessarily of the War Department.

END

Men trained in parachute work by the Army and considered experts in that field. Any enlisted man can request the trade he wants.



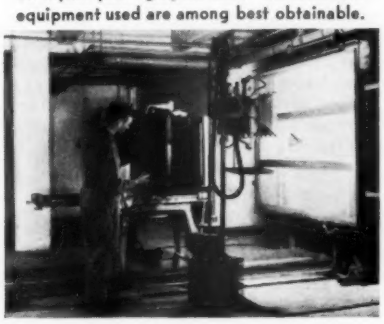
Almost all the work now being done on the Bell "Airacuda" is being done by Army specialists. Above are engine experts at work.

Radio obviously is a specialty. Experienced military radio men are in demand by civilian organizations because of their ability.

Still a comparatively untouched field is that of aerial map-making and mosaic work. The Army has pioneered much in this work.

Instrument experts also are trained by the Army. Not many schools can afford equipment like that owned by the Army.

Military photo sections have produced many an expert photographic man. Cameras and equipment used are among best obtainable.



Aircraft manufacturers are using psychology tests now to check their employes. Above is a Lockheed man taking one of the tests.

CAN *you* FLY?

by JOHN R. HOYT

Psychologists have started probing into the flying game to the extent that it's now possible to see your abilities on paper.

ALTHOUGH it is claimed that anyone can learn to fly the lightplane, there always are exceptions to the rule. According to recent study it is possible to determine with reasonable accuracy these exceptions, to tell before a person sets out in the plane for his first flying lesson whether or not he or she will ever make a safe, competent pilot!

As we will point out in a subsequent article, the Link Trainer is a valuable aid in analyzing the would-be pilot. In perfect safety he can "fly" the Link Trainer under contact conditions with the hood open, take instruction in turns, banks, straight-and-level flight and thus demonstrate his probable ability in a real airplane. Further, after a few hours in the Link he is better prepared to step into an airplane and in most cases can solo with less instruction than he might have taken under other circumstances.

But let us suppose that you are anxious to fly. You wonder—as most of us do—if you can solo safely. After all, you might be that *one* exception to the belief that "anyone can learn to fly!" Before taking flying lessons and spending from eight to 15 hours of your time and money you would like to know with reasonable assurance just how you would turn out. Is there any way, other than the Link Trainer method, of ascertaining?

Psychologists say "yes." For the past years experiments have been carried out that indicate a high correlation between classroom tests and airport results. It seems as far as present results go, that we can determine within acceptable margins the individuals who will become safe pilots and those who will not. Of course, there is not 100 per cent accuracy in these tests because the human element (both in the person giving the test and the one being tested) does not permit such accuracy. But the results are so good that it is hoped to classify accurately 90 to 95 out of 100 persons studied!

First of all, the psychologists wanted to determine the *primary abilities.* What can you do? How can you do it? What are your reactions? How is your visual and special concept? In order to arrive at a method of testing, seven groupings of primary abilities were made, called *factors of ability.*

1. Perpetual factor
2. Verbal factor
3. Number factor
4. Visual space factor
5. Memory factor
6. Inductive factor
7. Reasoning factor

These are part of the Thurstone Primary Tests of Ability and may be given in a few sittings of a few hours each. After determining the primary abilities, the task of devising a suitable test to reveal them was attempted (it is the devising of a suitable test that is most difficult). For example, how would you attempt to test your perceptual ability, or quick intelligence? The psychologists concluded that a person's ability to recognize a situation at a glance and rearrange it indicates that individual's perceptual ability. Do this:

In the following series underline similar groups: (Example: PXY PGR FGR EZY POQ. Each group underlined contains the letter "P").

PXY ODG ERT OYX PUS ROG PEK HOR PBH HRI ELC XJE PRO AYW POP PQP

In the following series cross out the

They may look like children's toys, but the pieces of wood above form a definite part of the psychology test being taken by an aviation employe. Note stop watch.

number that is different: (Example: 123-123; 324-354.)

134-134; 567-587; 789-789; 642-652; 489-489; 425-725; 728-729.

Now then, could you do a thousand or so of these in a specified time, make few mistakes and not blow up while doing them? Such a test actually indicates your quick perception. For instance, in coming over a strange airport would you always see accurately which way the wind sock was pointing? How many planes were taking off, landing, or taxying out? Which runway was muddy, or under repair? If you were flying cross-country would you always, invariably and instantly recognize the best emergency field, the direction of the wind, the terrain-map relationship, and the nearest airport? It seems that those who rate high on the test do well in practice.

Can you add accurately? Multiply? The tests in them are quite simple, consisting of several columns of figures already added. All you have to do is check them, mark which ones are right and which ones are wrong. For example:

22	4678
47	7381
59	
66	11959
184	

The same technique is used in testing the verbal factor, an example being something like this: Underline the words having opposite meanings:

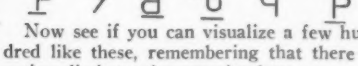
few—fast—rapid—many.

black—sticky—molasses—white.

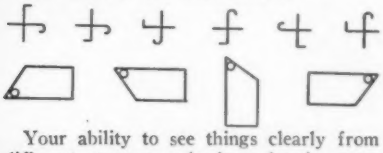
Can you do a full page of these and not get mixed up? Well, don't worry about it if you cannot, because no correlation between these tests and aviation have yet been noted; that seems logical enough, be cause none of these tests or factors seem to be connected with flying (Did we hear someone say, "How about navigation?" True, we must know our figures to navigate, but in this instance we are concerned primarily with *actual* flying.)

Now comes one of the really important tests. In this one good pilots rate high, poor pilots low. It is called the visual space test and consists of a few hundred problems in testing your ability to think in different dimensions, much as you would be required to do in a loop, a turn, or a glide. Here are just a few:

Example: Underline all letters that are similar:



Now see if you can visualize a few hundred like these, remembering that there is a time limit to the examination:



Your ability to see things clearly from different, strange angles has a bearing upon your ability to fly. Good pilots do not become confused, lose their patience, or explode and they seem at home in the third dimension. This is entirely logical, because a pilot must be adept and above average in visual-space perception.

The last three of the written tests are very important and show high correlation between those who do them well and those who become good pilots. First in order is memory; obviously you must remember many things in order to solve the continual problem of throttle setting, drift, wind direction, rudder, and stick. Although the test may have some shortcomings, try it anyhow:

Example: First, memorize Col. 1. Then —and no peeking—fill in the blanks in Col. 2:

1	*2*
J. R. Martin	Girl .....
B. F. Smith	Smith .....
A. S. Jones	Brown .....
E. L. Brown	Boy .....
Box—6	Martin .....
Boy—2	Car .....
Car—8	Jones .....
Girl—9	Box .....

How well you could perform on a list of 20 or 30 numbers? How well could

(*Continued on page* 56)

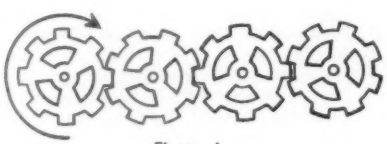


Figure 1

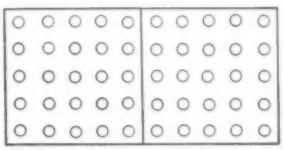


Figure 2

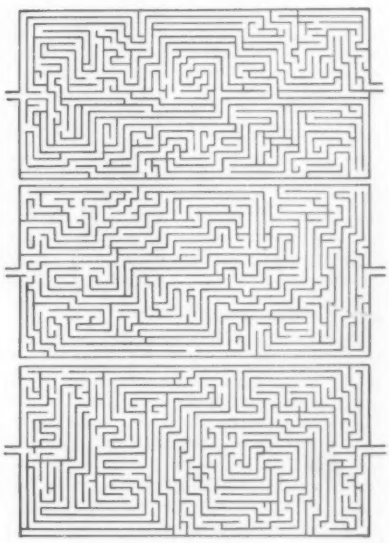


Figure 3

'RAGS TO RICHES' AIRLINE

Loading passengers at Billings, Mont., is an Inland Boeing 247D. Inland operates into 11 western cities.

by Milton Van Slyck

Perhaps you've never heard the name. But Inland Air Lines really is a foundation stone in the airline industry.

THE next time an air-minded friend starts to tell you about the air transport industry, just ask him to name seven airlines besides the "big three" transcontinentals — it ought to be easy! The odds are two to one, unless he's really up on his stuff, that after the third or fourth line he'll start hemming and hawing. By the time he reaches the fifth the chances are he will be stopped cold.

Dick Leferink

Marvin Landes

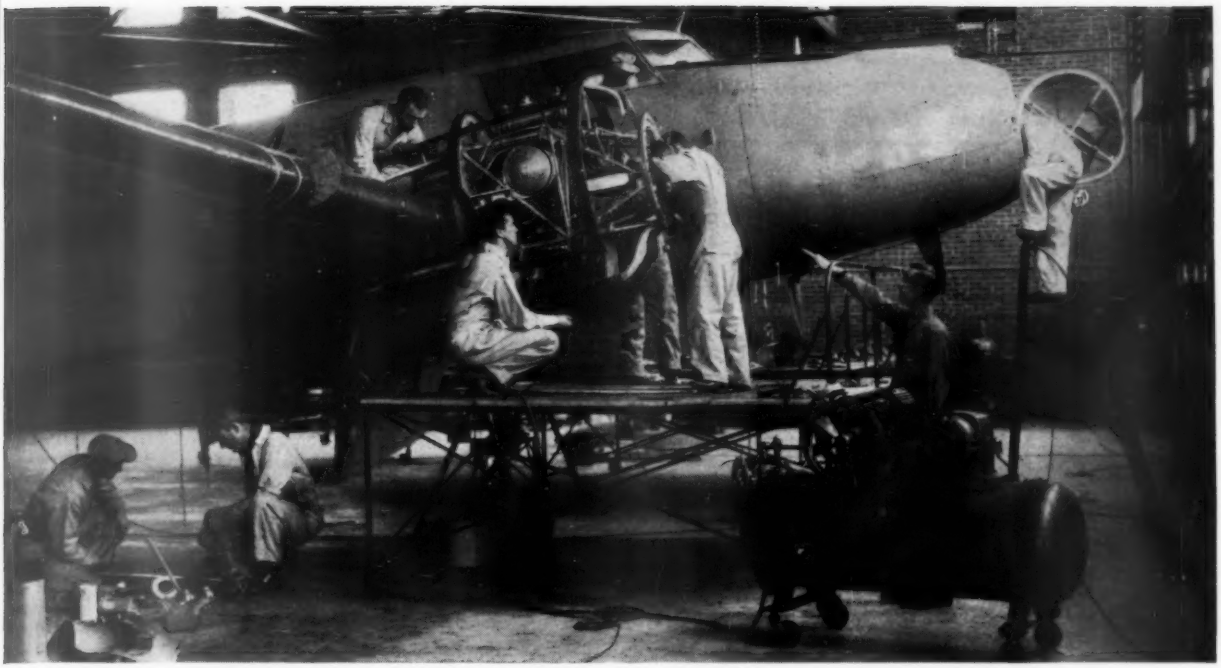
The reason is simple once it is analyzed. The bulk of this nation's 17 airlines—listed at the end of this article—are made up of what is known as feeder systems or, in the vernacular, "narrow gauge" operations. The praise given accomplishments of the major airlines is familiar, made so by the efficient publicity departments which the trunk lines carry as an adjunct to sales promotion and advertising departments. The feeder routes, by comparison, are local in character and while usually quite well known in their respective areas, little is heard nationally of their expansion and progress. But they are in reality the circulatory system supporting the framework of the air transport industry. Testimony as to their importance is contained in the fact that the feeders account for more than 20 per cent of all revenue passenger miles flown by the regular scheduled domestic airlines.

The narrow gaugers are unsung, but they are not idle. Definite progress from month to month, from year to year is recorded by the feeder systems and they are making the trunk lines more and more dependent upon them for aid in keeping the latter's huge transportation systems busy. Running mostly north and south, the feeders form a gridiron-like pattern across the long, sweeping east and west transcontinentals. Day in and day out, with a safety record of 100 per cent for well over a year and a half, the feeders have been handling more than a quarter of all the airline traffic in the United States. They also send many passengers out across the oceans and to Latin America.

Running through the history of the narrow gaugers there's a saga not of big business, but of pioneering and individual achievement, of heartaches and a downright determination never to say "uncle." A typical example of a feeder line that made good is Inland Airlines, Inc. Traversing three states and nearly 1,200 miles, this 10-year-old company truly serves the West. Montana, Wyoming and South Dakota are the scene of its operations. From the standpoint of seniority in the air transport industry, it tips its hat to none and its president has held that title longer than any other airline president in active service today.

The story of this oldster in the feeder business goes back to the lusty days when barnstorming between schedules made up the deficits which the then ambitiously operated young airline almost inevitably produced at the end of each month. Originally chartered as Wyoming Air Service, that name was discarded for Inland Airlines, Inc., when the company spread into neighboring states. In May, 1930, Wyoming Air Service came into being at Casper, Wyoming. The company was organized for charter trips, student training, sight-seeing flights and just plain barnstorming. Founders of the enterprise are two brothers—Dick and Joe Leferink. Dick today, as in 1930, is president of the line and Joe keeps his hand in flying as a captain on regular service.

Chief asset of Wyoming Air Service, besides the crowded aviation background of its president, was an old three-passenger Stinson SM8-A powered with a 215 h. p.



Inland's complete maintenance base at Cheyenne keeps the line's fleet of Boeings in perfect condition.

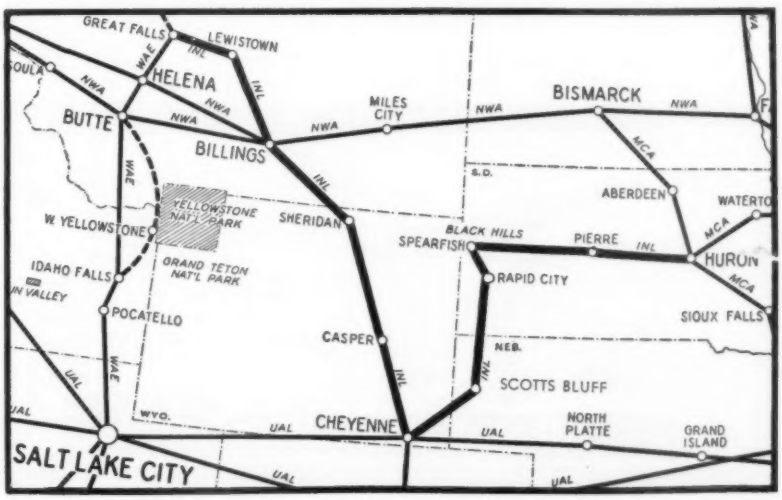
Lycoming engine. Dick Leferink, just turned 40, was barely 30 years old when he started out on the path which was to lead him to the modern transport system now operated by Inland Airlines. Born in Grand Rapids, Mich., he had absorbed every piece of aviation literature that he could lay his hands on by the time he was 17 and the war offered an opportunity to fly. He enlisted in the Army as a flying cadet in October, 1917; was commissioned a second lieutenant and assigned to active duty as an instructor at Hicks Field, Fort Worth, Texas, in May, 1919. Honorably discharged in December, 1919, it was not until 1920 his course for the future first began to take form. Serving as an instructor and barnstorming all over the West, Dick Leferink sold aviation. Many of the pilots flying the major lines today first received their tutelage under Dick.

Based at Casper, married and with two children, Dick decided that the time had come to settle down and in 1930 he incorporated Wyoming Air Service. Charter trips were fine but had definite limitations. Realizing, too, that there was a growing need for a network of air routes over the long distances of the West, a regular daily passenger service was inaugurated in March, 1931, between Casper and Denver, Colo. In September the route was extended northward to Billings, Mont., thus bringing the company's operations into a third state. Upon the establishment of regular passenger service, another of the company's present day key men joined the organization. Marvin Landes, now 38, a former Chicago and North Western Railroad engineer from Lander, Wyo., felt that the iron horse was getting spavined and decided to associate himself with the new form of transportation. Dick would be poised in the pilot's seat, while Marv, in sideshow barker fashion, would try to induce the spellbound crowds to part with some of their cash for a bit of aerial transportation.

There were disappointments and there were laughs in those days and sometimes when Marv and Dick have finished their day's work, they reminisce about the "good old days." Sooner or later, among the endless anecdotes, Dick will come up with the one about the Stinson SM8-A and the inspector. The anecdote concerns the days when Dick was piloting the barnstorming Stinson and Marv was selling the seats. Dick always claims that Marv could have made a fortune as a barker.

When in those early days Marv Landes set out to sell transportation, his enthusiasm for the job had a way of miraculously growing in direct proportion to the size of the bankroll needed to keep the airline in operation, Dick will recount. And, he adds, usually his enthusiasm was high, very high. On one occasion the Stinson already was bulging with passengers. Built with accommodations for only three, Marv already had piled four into the cabin and with undiminished enthusiasm continued to admonish the crowds with "Come on folks, plenty of room for one more—plenty of room." Out of the curious onlookers, Marv spied a likely looking candidate. He looked like ready cash and Marv went after him. "Plenty of room, folks—space for you, mister." He held up his finger much as a taxi driver soliciting a fare. The man stepped forward and questioned whether

Sometimes called The Route of the Broken "V," Inland operates into 11 cities in Montana, Wyoming, Nebraska and South Dakota. Main lines it feeds are Northwest and United.



Typical of the modern facilities along its system is Inland's base at Casper, Wyo. For the year ended June 30, 1940, Inland carried 10,342 passengers 2,701,994 miles.

there really was room for "one more." Marv confidently assured the stranger that no fear need be entertained as the plane would safely and comfortably hold one more passenger. Thereupon the stranger introduced himself as an inspector from the Bureau of Air Commerce and expressed great interest in how a three-place passenger ship could hold five passengers—and in comfort.

The company survived that experience as it did many other trials and tribulations during its early years. When payrolls became difficult to meet, Dick would roll out his ship and with Marv acting as barker, they would go on a barnstorming tour to raise the needed cash. Service on the line was daily, except Sundays, which were devoted to barnstorming. When they acquired a second Stinson SM8-A one was used to do the regular line work between Denver and Casper while the other barnstormed. Additional equipment was added to the growing line until the company owned six Stinsons, providing ample spares for the lucrative barnstorming trade.

What a contrast that picture makes with today's: The long, devious trail, which saw an old Stinson charter service, run on the proverbial shoe string, transformed into a modern, precise air transport system, is an epic in the history of domestic air transportation. From the hit-or-miss methods fostered by necessity has arisen the sleek, multi-engined operation over lighted and radio-beamed airways. With it has come a 100 per cent safety record. It is a trail to which Dick Leferink stuck and from which he refused to swerve despite what sometimes appeared to be overwhelming odds. Today Dick Leferink and Marv Landes between them own about 75 per cent of the airline's 164,218 outstanding shares. Total assets of the company are more than $3,750,000 and Inland has just finished installing an overhaul base at Cheyenne and other capital improvements.

The Air Mail Act of 1934, which sets a bench mark as a definite turning point in the development of commercial aviation in the United States, was of no small importance to the little outfit still known as Wyoming Air Service. The company, in May, 1934, was the successful bidder for an air mail contract known as Route 17, between Cheyenne and Pueblo, Colo., via Denver and Colorado Springs. A month later the company was again a successful bidder and obtained a contract for Route 28 from Cheyenne to Billings, Mont., via Casper and Sheridan. Subsequently this route was extended from Billings to Great Falls, Mont. The line from Pueblo to Billings proved a great boon to the area served and became a vital transportation link in those three states. The pioneering and development fostered by the line had another interesting aspect in its contribution to the further extension of the larger major transcontinentals.

United Air Lines at that time wanted to place Denver on its transcontinental run. Although going through Cheyenne, about 100 miles north, United could not serve Denver without the Post Office Department's permission. Such approval was generally not easily forthcoming. Finding it imperative to have an entrance into Denver, United decided to purchase Route 17 from Cheyenne to Denver. They paid $209,000 for the route. The pioneering air line then sold the Denver to Pueblo section to Varney Air Transport, Inc. (now known as Continental Air Lines) for $35,000. A few days after United made its purchase, the Post Office Department granted that company permission to enter Denver. By that time, however, United was committed to buy Route 17 and paid the price.

Divested of part of its line, Wyoming Air Service obtained a third air mail contract in August, 1937, to operate what is known as Route 35 from Cheyenne to Huron, S. D., via Rapid City, Spearfish and Pierre. This new air route practically paralleled in the sky a path that in 1870 brought thousands of gold seeking men and women along the famous Deadwood Trail to the Black Hills from Cheyenne. The first flight from Cheyenne over the Black Hills to Huron had to wait until April, 1939, before adequate airport and intermediary airfields were available to permit operations.

As the company broadened its operations, it became apparent that the name Wyoming Air Service was too confining. As a result, Inland Air Lines, Inc., became the successor corporation by change of corporate name July 1, 1938. No change was made in the company's management. Arduous and lengthy train trips are averted by the operations of Inland. For example, the train time between Great Falls, Mont., and Denver, Colo., is 29 hours and 35 minutes with a round trip fare of $56, including berth. Inland makes such a trip possible in 5 hours and 15 minutes, charges only $55.79 for the round trip. Many communities with poor train service or with none whatsover have been given modern, rapid transportation by such feeders as Inland.

Through its interconnections with other lines Inland places the communities it serves closer to all key cities in the United States. Connecting with United Air Lines at Cheyenne, all transcontinental points on that system are accessible to Inland's communities. Connection also is made with Northwest Airlines at Billings. At Great Falls a juncture is made with Western Air Express. Schedules are also coordinated at Huron with Mid-Continent Airlines.

The trunk lines are benefited to an important degree by the existence of these feeder lines. For example, the picturesque Black Hills and dude ranch country served by Inland is a fertile source of traffic to a company such as United. It would be difficult for United to obtain this summer travel were it not for the fact that Inland was operating and serving these vacation spots. Examination of the year ended June 30, 1940, shows that the volume of traffic interchanged between Inland and United amounted to approximately $50,000. Many passengers use United because their destinations are at points served by Inland.

Inland's operations figures for the past three years and an estimate of 1940 traffic and revenues follows:

Years Ended June 30	Passengers Carried	Revenue Passenger Miles Flown	Total Revenues
1937	7,745	1,083,081	$231,035
1938	3,314	863,882	186,728
1939	6,152	1,564,418	397,375
1940	10,342	2,701,994	474 009

The first year which reflected operations of the company without the Cheyenne-Pueblo route, sold during 1937, was 1938. Results for 1940 show a substantial increase over that of 1937 in spite of the loss of certain mileage.

(*Continued on page 74*)

Merchandising, like this large street poster in Great Falls, Mont., is widely seen all along Inland's route. The line serves several towns that lack train service.

NORWAY FLIES ON

by KURT RAND

Though the Nazis have occupied their homeland, the Norwegian air force continues training in Canada.

The men in the picture at the top of the page are Norwegian flying cadets at a Canadian air base. Directly above is a Norwegian naval airman (center) and two Norwegian army flyers.

A NEW Royal Norwegian Army Air Force and a new Royal Norwegian Naval Air Force are in the process of being built in Canada to eventually take their place as fighting units alongside their allies, the Royal Air Force. About 1,000 officers and men will be in training at the Norwegian air training camp at Toronto this winter. They will train on Canadian and American-built planes, trainers and fighters. Before Norway was occupied by Germany the government had ordered a number of planes from the United States. Norway also took over orders for planes given United States factories by Poland. In all 100 planes are being delivered to Norwegian air forces in Canada, including 33 Lockheed *Hudson* bombers, 32 Curtiss P-40 fighters, Northrop seaplane patrol bombers and Fairchild basic trainers. All are marked with Norse red, white and blue horizontal stripes on the wing tips. Norse officers are non-committal on delivery figures of these American-built planes.

When Norway was invaded last spring its two air forces had less than 300 planes among them, mostly British, German and Italian makes. Personnel of its air force was similarly small. There had been no war since 1814 for Norway. Among Norway's front line ships were de Havilland *Tiger Moths*, Fokker bombers; the former are used for elementary training by Canadians and by Norse flyers for refresher courses. Most of Norway's planes were bombed at airports or lost in the defense of the country. Only about a thousand members of the air forces escaped to Great Britain. Most of these are now in training for the new Norse air forces, while some are flying in British squadrons.

The men who make up the new Norse air forces include veterans of the Norwegian campaign who escaped by boat, by swimming—and one group even by flying a captured German Heinkel bomber to England. Some escaped in small fishing smacks, some in larger boats which were bombed by the Germans on their way to the Shetland Islands. Typical is the experience of one trio who were in a small motor-powered fishing boat when a German submarine came up close to them, surveyed them, and finally decided they were not worth even one torpedo. They escaped by passing as harmless fishermen, but one of the trio had nine years of commercial flying giving him a total of 4,000 flying hours.

Maj. Bjarne Oen, in command of the Royal Norwegian Army Air Force at Toronto, escaped the Germans, after fighting in Norway, in a small fishing boat with 18 others. They had started out in a larger fishing schooner but it had been bombed. The smaller boat finally brought them to England.

Capt.-Comm. H. Riiser-Larsen of Amundsen-Ellsworth North Polar fame, who went to the rescue of Nobile and Amundsen in 1928, now is in command of the new Royal Norwegian Naval Air Force. Before coming to Canada he served since coming to England as Norwegian naval attaché at the Norwegian Embassy at Washington. He escaped the Nazis by boat with his wife, by way of Stockholm, Moscow, Bucharest, Milan and Paris.

Heading all the Norwegian forces in

These officers are commanding the Norwegian air forces in Canada. Left to right: Capt. Jens Hertzberg, Maj. Bjarne Oen, Comm. H. Riiser-Larsen and Comm. A. W. Hagtvedt.

Canada—there is also a naval force in training in eastern Canada—is Gen. William Steffens, commander of the west coast defenses prior to the withdrawal from Norway. He is liaison officer between the Norwegian government-in-exile in London and the Canadian government at Ottawa.

The new Norwegian air forces will be self-sustaining units, complete from pilots to ground personnel. Experienced pilots now are taking refresher courses using, among other planes, Fleet *Finches*, de Havilland *Tiger Moths* and Fairchild advanced trainers. They are also taking courses in navigation, radio and English. Air gunners, observers, radio operators, and navigators will be trained from among the Norse airmen. Ground crews, maintenance and supply crews are learning the intricacies of American-built engines and planes.

The Norse flyers began arriving in Canada early in August, mostly from England. Volunteers among Norse nationals in Canada and the United States have been arriving in a steady stream to augment the men who escaped to England. It is understood that other western hemisphere countries have also contributed men. Most of the Norse flyers arrived in Canada minus uniforms, some with borrowed British uniforms. A standard uniform has not yet been designed, as Norse uniform stocks were left behind in Norway. It is expected that a uniform somewhat similar to that of the Royal Canadian Air Force will be used, with distinctive Norwegian insignia. Norse flyers, incidentally, wear their wings on the right side, while Canadians and British airmen wear the insignia over the left top tunic pocket.

Training activities of the Norwegians will center at Toronto's Island airport near where a camp has been built with barracks, mess halls, officers' quarters, hospital, shops, instruction halls and guard house. The camp is a bit of Norway on Canadian soil and Norwegian is the language used.

The addition of Norway's air forces to the main British forces brings the flyers of another Nazi-conquered nation under the Royal Air Force. Already flying with the British, in addition to the Norwegians, are those flyers who were saved from the air forces of Czechoslovakia, Poland, Holland, Belgium and France. These, together with Canadians, Australians, New Zealanders, South Africans, some Indians and a few Americans, make the Royal Air Force unquestionably the most cosmopolitan band of airmen ever to be joined together anywhere on earth.

END

Much preliminary training of Norwegian pilots is done on American-built Fleet biplane trainers like that below. Position taken by prop-puller is just for picture.

Some Gal!

THE photograph below is not entirely an airline publicity gag. But what the story lacked, Braniff Airways' enterprising press agent added. Anyway, Our Hero is Gordon Shook, district traffic manager for Braniff at San Antonio, Tex. The story, as we get it, is that Mr. Shook—or Hostess Shook if you prefer—was aboard one of his line's ships one morning recently when the plane's actual hostess, Miss Mary Triplett,

This is charming "Hostess" Gordon Shook.

became indisposed and got off the plane at Kansas City. It was pretty early and there wasn't another girl available. Being a faithful employe, Our Hero eyed the 14 hungry passengers, donned the departed hostess' cap and sailed into the job of serving breakfast. By the time the southbound airliner reached its destination there were at least 14 airline passengers who were thoroughly sold on male hostesses. Mr. Shook also is an honorary Braniff pilot.

New Fuel Pump

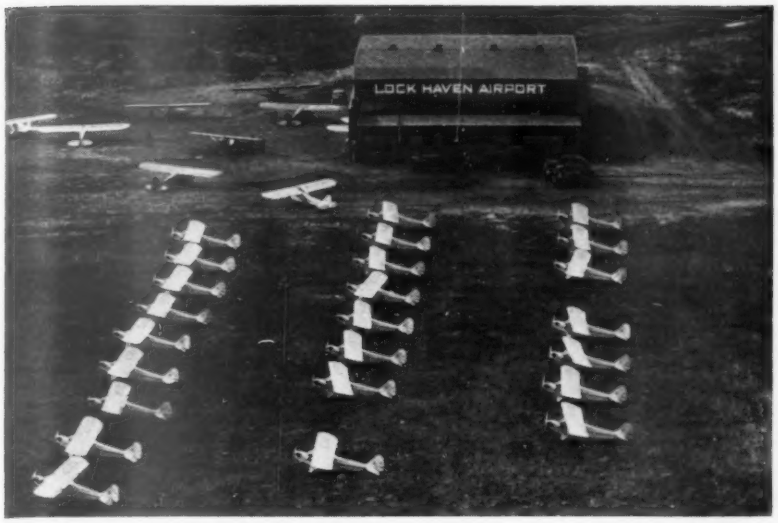
AN Army Air Corps sergeant has perfected a new aircraft fuel pumping system expected to be adopted soon for use on military ships. Sgt. Ralph E. Gray, stationed at Wright Field, developed the hydraulic fuel system which has shown that it materially increases aircraft performance at higher altitudes. In the past, the main difficulty in flying at high altitudes has been the presence of "vapor locks" in the fuel system, formed by the vaporizing of high test gasoline within the fuel lines. Sergeant Gray's new system now permits constant operations well above 20,000 feet.

No Kidding!

ONE aircraft factory recently posted this bulletin:

NOTICE TO CARELESS MEN

Before going to work, will you please stop by the office and leave a few notes as to your place of birth, relatives and any other information that might help us in making out your obituary.



About 80 per cent of all U. S. civil aircraft are being bought on time payment plans.

FINANCE YOUR FLYING

by DeWITT WENDELL

Buying an airplane these days is as easy as owning a car. Aircraft finance companies have done so well the banks are getting interested.

SO you're buying that new airplane on easy payments, eh? Well, the boys who make it easy to buy are around even to airplanes now. Just goes to show you that the airplane is here to stay. It's in the same class now as the automobile, the radio, the refrigerator and the fur coat—you know, buy it in the summer and pay for it by Christmas. Only you can have your airplane now and pay for it later.

But seriously, it's the fashion these days to get your new airplanes just like you buy your automobiles. One-third down and the rest over 12 to 20 months at six per cent interest, plus insurance. You can even do it with second hand airplanes, only here it's 40 to 50 per cent down and six per cent and up. Approximately 80 per cent of all the non-military airplanes sold in the United States in the last three years have been "financed" in just this way. This year nearly all the smaller new ships will be financed.

How do you do it? Remember the motto of the finance boys: "It's easy." You go to your finance company representative we'll give you the names of a few of the better known companies a little later—and you say to him:

"Jim, I'm going to buy an (Aeronca, Piper, Luscombe, Taylorcraft, etc.) and I want to finance it."

Jim will give you an application. This is an application for a loan that will enable you to pay off the aircraft company at once, just as a motorist financing an automobile pays off the automobile manufacturer at once. The application will contain a number of questions that must be answered in full. For instance the finance company—or bank—will want to know what kind of airplane you are going to buy, and how much you propose to pay for it. They'll want to have a few credit references—just to prove that you're solvent and probably will pay them back some time or other. Then they'll want to know all about your own flying career—or, if you are to have your first instruction in your own plane,

(*Continued on page 76*)

Typical of promotion by finance companies is the brochure below. Example of the comparatively recent effort of banks to enter this field is the advertisement at right.

NATIONAL DISCOUNT CORPORATION

ANNOUNCES

FOUR PLANS

FOR FINANCING NEW TRAINERS TO BE USED IN THE ADVANCED TRAINING PROGRAM OF THE C.A.A.

IN CONNECTION WITH

NATIONAL DEFENSE

10% DOWN ON COST OF PLANE PLUS MINIMUM INSURANCE PREMIUM DEPOSIT

PLAN 1	PLAN 2	PLAN 3	PLAN 4
10 PAYMENTS	12 PAYMENTS	15 PAYMENTS	18 PAYMENTS
First Payment 10 Days From Date of Contract	First Payment 30 Days From Date of Contract	First Payment 30 Days From Date of Contract	First Payment 30 Days From Date of Contract
EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE
Your Cost $7600.00	Your Cost $7600.00	Your Cost $7600.00	Your Cost $7600.00
Insurance	Insurance	Insurance	Insurance
14% of Cost 1064.00	14% of Cost 1064.00	1½ Annual Premium 1330.00	1½ Annual Premium 1596.00
$8664.00	$8664.00	$8930.00	$9196.00
Initial Payment 1000.00	Initial Payment 1000.00	Initial Payment 1000.00	Initial Payment 1000.00
We Finance $7664.00	We Finance $7664.00	We Finance $7930.00	We Finance $8196.00
Charges	Charges	Charges	Charges
4% of Balance 306.50	5% of Balance 383.20	6½% of Balance 515.45	8% of Balance 655.68
$7970.00	$8047.20	$8445.45	$8851.68
Monthly Payments $ 797.00	Monthly Payments $ 670.60	Monthly Payments $ 563.03	Monthly Payments $ 491.76
12 Months Insurance Coverage	12 Months Insurance Coverage	15 Months Insurance Coverage	18 Months Insurance Coverage

ALL EXAMPLES BASED ON WACO PT 14 Cost $7600.

INITIAL PAYMENT ON TRAINER AND INSURANCE

Cost of Trainers From - To	Initial Payments
$6000 - $6500	$ 800
6500 - 7000	900
7000 - 7500	950
7500 - 8000	1000
8000 - 8500	1100
8500 - 9000	1200
9000 - 9500	1300

— INSURANCE —

14% PER ANNUM OF COST PRICE OF TRAINER

FULL COVERAGE — NO DEDUCTIBLE ON WINDSTORM - LAND DAMAGE - THEFT AND FIRE WHILE NOT IN FLIGHT

CRASH AND FIRE IN FLIGHT . . . 5% DEDUCTIBLE

If Desired

Automatic reinstatement of coverage in event of partial loss and prorata return of premium in event of total loss can be obtained at 14.76% per annum instead of 14%.

NATIONAL DISCOUNT CORPORATION has financed dealer and consumer purchases for 18 years and are well equipped, financially and by experience to offer

PROMPT and FRIENDLY SERVICE

the "First National" will help you buy

★YOUR OWN PLANE★

HERE in San Diego, the air capital of the west, we have watched the rapid and sound growth of aviation. Month by month records have shown more hours flown, more mail and express carried, and more passengers delivered safely. We have seen remarkable progress in industry, and hundreds of names have been added to the list of able pilots.

Each happy landing has increased the number of boosters for this modern method of transportation, and has created a desire among many to own a plane of their own.

You are invited to discuss an airplane loan with any officer of the "First National" at the main office or any branch.

The First National Trust & Savings Bank

The Pioneer Bank of San Diego, Air Capital of the West!

*Branches at 30th and University — at 5th, Fairmount and University — Coronado — La Mesa

Most of the country's airlines are using the "sample flight" technique in selling flying to the average man.

FREE FLIGHTS For CASH

by DORIS AHNSTROM

The courtesy flight is an important part of every major airline's promotional and educational program. It pays dividends.

BACK in 1882 Mrs. J. P. Doakes sauntered into the village pharmacy, noticed a tray of samples on the front counter and the sign overhead which read: "Free Sample—Take One!" She made her purchase, obeyed the sign then rustling her bustle went home to test the free offering, perhaps to become a steady purchaser of Blank's toothpaste. Sampling has been a business habit for more years than any of us are old. At long last a type of sampling has found a niche for itself in the business of air transportation. This type is referred to within the industry as "courtesy flights." But it's still sampling.

Perhaps induced by the "I'm-from-Missouri-you-got-to-show-me" attitude of the general public, most of the country's commercial airlines have enlisted the sample flight technique in an effort to sell aviation to the vast majority who can be, but are not as yet, air travelers. Acquainting prospective passengers with the entire operations system of the airline and demonstrating the easiness of actual flying has done as much to sell air transportation as any other single method of promotion. Experience, however slight, being the proverbial best teacher has convinced even the most doubtful that it pays to fly. That it pays in time saved, in comfort and in real pleasure.

The slogan, "It Pays to Fly," adopted by the Air Transport Association stares down at you from billboards, peers out at you from between the covers of the leading magazines; buttons bearing those three words wink at you from the lapel of boy friend or husband's coat. Proving that slogan is the task of the airlines and one of their best methods of persuasion has been in the just-try-it-and-you'll-buy-it class. Courtesy flights, or sample trips if you wish, are in most cases hops of from 30 to 40 minutes' duration around the respective cities giving first-flighters a complete though miniature picture of air travel, its operations, equipment and actual flight conditions. It being an established theory that *all* fear of flying is *on the ground* the air transport companies have found an effective treatment for this psychosis in exemplary flying, courtesy trips to prove to the individual the worth of air travel.

In 1939 the combined airlines of United, Transcontinental & Western, American, Pennsylvania-Central and Braniff Airways carried approximately 60,231 passengers on 2985 free flights. These free trips are developed by either the publicity or traffic departments of the airlines. Some are given for the promotion and possible sale of a scrip plan to a business firm; others are arranged for purely educational purposes to school groups, youth organizations and adult clubs; others are mere gestures of good will, aeronautical thank you's for either patronage or public promotion. In spite of the fact that the combined airline companies of the United States flew 1,717,090 revenue passengers during 1939 it has been estimated that 95 per cent of the people in this country have yet to make their first trip by air. Through the medium of courtesy trips the airlines will subtract from this non-flying group and add to the veteran air traveler list.

Of course the number subtracted will be small by comparison with the whole, but it evidences the airline operators' constant ef-

fort to prove the merits of air travel. The favorable results of these efforts are apparent in the figures on the yearly increase in the number of revenue passengers carried. Each courtesy flight is operated in the same manner as a scheduled trip. It is at all times under the watchful eye of the control tower; it is manned by a similar crew of captain, co-pilot and stewardess. In short, it's the same trip in 30 minutes as the four-hour New York to Chicago flight.

The New York office of United Airlines operates three courtesy trips a week or about 150 a year. Carrying a full load of passengers each trip, United offers get-acquainted hops to at least 3,588 prospective customers each year. Of that number it is estimated that between 50 and 75 per cent return to fly again and again. American Airlines, Eastern, Transcontinental & Western, Pennsylvania-Central, Braniff and many other airways follow similar plans.

One outstanding example of courtesy flying, an educational one, was the experiment known as the Air Youth Project undertaken by TWA with the aid of publisher Thomas Beck. This involved the flying of more than 1,700 students in Albuquerque, N. M., and the compiling of their reactions to air transportation. Mr. J. C. Franklin, TWA engineer in charge of the project, said the effect of the actual flying experience gave the students more confidence in air travel and a clearer understanding of the mechanical elements in airplane operation. In most cases, this reaction was passed onto the parents. The statistical charts of this experiment denoted a decided trend in favor of airlines. Similar favorable reactions are observed daily in the test rides of first-flighters who leave the 95 per cent non-flying group to become paying airline passengers.

Many of the airlines employ sample trips for the introduction of new equipment. Braniff Airways recently guest-hopped 2,300 people to acquaint them with a new fleet of Douglas DC-3s. Braniff estimated that at least 750 of the guests had never been off the ground before. Pennsylvania-Central Airlines applied this same method of promotion recently in the introduction of new DC-3s to more than 2,000 individuals the majority of whom had never flown prior to their sample ride. In celebration of its 13th birthday the airline had as its guests several groups of 13-year-olds whose birth dates were the same as that of Pennsylvania-Central. Ice cream and cake were served the happy celebrators as they flew above Washington, Detroit and Pittsburgh.

To show off the transatlantic Clippers, Pan American Airways carried 200 persons, members of the State Department included, on preview flights over Washington. Similar hops were made in New York. Each trip cost Pan American $300 or more—rather an expensive "how do you do."

Airlines frequently conduct courtesy flights for women's clubs. A maxim in the air transportation industry says that the way to sell a man on flying is to sell his wife.

Realizing that in many cases it is the wife who objects to air travel and who subsequently keeps "papa" from using that method of transportation, the airlines are united in their efforts to convert the gentler sex. Braniff Airways held women's parties in Kansas City, Oklahoma City, Dallas, Fort Worth, Austin, San Antonio and Houston. Social leaders of the various cities were invited to attend the get-together at their airport. During the course of the afternoon members of the party were offered a hop in one of the new planes. Although many had vowed not to put foot off the ground one look at the new fleet of ships was all they needed. They all changed their minds and joined those already agreeable to a first flight. *All* were sold on *all* that air travel has to offer.

Many a scrip plan has been sold to a business organization by flying the wives of the executives as well as the executives themselves. Once having sold the power behind the throne it has proven comparatively easy to sell the scrip plan to the company. The average 30 or 40-minute courtesy trip is operated at a cost of from $80 to $100. Using $90 as the medium it can be estimated that it cost the airlines in the vicinity of $268,650 for their 2,985 free trips in 1939.

Though there are no actual figures on the net return of such an expenditure, it can be surmised what just one free trip may pay in the way of return. Selling a scrip plan to a local business that employs traveling salesmen may mean an average return of $800 a month. If the sale of a scrip plan is for a national account, it may mean a return of from $1,000 to $5,000 a week. Not every trip given by an airline is to sell a scrip plan, but if out of 150 such trips made from one city in a year the airline sells just one national account, the return will be on the right side of the ledger and compensate for the year's courtesy hops from that city. It definitely pays to fly—free flights for cash!

END

Many unfortunates, like the crippled children below, are given their first airplane rides by generous airlines. Such thoughtfulness is rewarded in publicity and good will.

You Don't Say!

True or False?
Sirs:

Just a line to take up the fight on page 82 of the November issue of FLYING AND POPULAR AVIATION. James S. Duncan, acting deputy minister of the Department of National Defense for Air at Ottawa, writes that your statements regarding two R.C.A.F. officers who were shot for dropping sugar in gas tanks and that pilot shortage and high training fatalities did occur—and are occurring—in Canada, are untrue.

I received the same report (the one about the R.C.A.F. officers), used it in my column [*in the Schenectady (N.Y.) Gazette.—Ed.*] and now am hunting through Canadian Press and Associated Press reports because I think it originated there, was carried notionally and, as a result, is widely known for fact.

Also, in Canada recently I heard the sugar story from R.C.A.F. flyers! They also said "there are plenty of crack-ups that don't make the papers." So far as your magazine is concerned, I'll believe it. After all, they've still got the old controlled press up there.

And, in your "Yanks for Canada" yarn (November issue) you have the statement that 500 hours is *required*. Five hundred hours are *wanted*. As a private pilot with a couple of hundred hours, I was eyed with interest when I appeared in Canada with my own ship and, as a matter of fact, was not only invited to join up but was urged to do so, given a lift from the airport to town and dropped off in front of the R.C.A.F. recruiting center on Bishop street in Montreal. An R.C.A.F. flyer drove me in.

Pilot shortage? You bet! Not much publicized is the fact that a hell of a lot of training is done on old DeHavilland *Puss Moths* and *Tiger Moths* and that Canada is having a hard time getting Americans to instruct on the antiquated old klunkers. Personally, I'd want more than $150 per week to instruct green students in them—if I could instruct.

DONN HALE MUNSON.
Schenectady, N. Y.

● The fact that either the Canadian or Associated Press carried the story in question does not necessarily make it true. Modern propaganda methods could easily "plant" such a false rumor with almost any news-gathering agency. But what might tend to bear out FLYING AND POPULAR AVIATION'S original item is the fact that Mr. Munson got this information from Canadian flyers themselves—which is pretty close to being first-hand.—Ed.

Puzzling Turn
Sirs:

About two years ago I wrote you, expressing my enthusiasm for an article by Tex Rankin having to do with centrifugal force and its effect on stalling speed ("You Can't Get Away with It!", February, 1939) and, as I had only recently soloed at that time, that article naturally helped me quite a bit, as no doubt it did other "youngster" pilots. Again, I am moved to commend you on the excellent article in the September, 1940, issue entitled "The Puzzling Turn" by John R. Hoyt. This article and that mentioned above I consider as two of the most instructive discussions pertaining to flying that I have studied and I again wish to thank you and the authors of these instructive articles for their unselfish efforts to pass on their valuable experiences to we less-experienced pilots.

T. C. RAYNES.
Oxford, Kan.

Sirs:

I have read with considerable interest Mr. John R. Hoyt's analysis of "The Puzzling Turn" and the use of top rudder in the September issue of FLYING AND POPULAR AVIATION. All of the logic and diagrams are fine, except for one thing—namely, that it is necessary to use top rudder in a banked turn and—stand by for the shock—to keep the ball in the center!

"Oops! Musta pulled the wrong string!"

Mr. Hoyt is correct in his contention that, regardless of the sharpness of the turn, the real turning control is the elevator, and in his scoffing at the idea that any sudden change of controls takes place at 45°.

Top rudder is necessary, however, in a steady turn to correct for the yaw caused by the top aileron which it is necessary to carry to make up for the loss in lift of the inner wing due to its lower speed. The ratio of the speed of the outer wing to that of the inner wing becomes a maximum at about 45°, which requires, at that point, the maximum of top aileron to hold a constant bank and, consequently, the greatest amount of rudder. Above and below 45° the amount of top aileron and consequent top runner decreases to none for straight flight at one end and none in the theoretical vertical bank where, as in straight flight, both wing tips are going at the same speed.

Now, of course, it is possible that Mr. Hoyt is referring to some airplane—and there are some—where no rudder is necessary to correct for aileron drag, i.e.: where the drag of the lifting aileron already is compensated for by other means. If so, however, it would not conform to the statement made that the discussion concerns itself only with conventional airplanes.

R. S. BARNABY,
Naval Aircraft Factory,
Philadelphia, Penn.

● Famed Commander Barnaby (recently named president of the Soaring Society of America) has us stumped. The buck has been passed to Mr. Hoyt; his reply will be printed here.—Ed.

Drafted Pilots?
Sirs:

. . . The forthcoming draft, I believe, is extremely vital to all licensed airplane pilots of this country, particularly those holding limited commercial or commercial certificates. . . . Just how have the President and members of Congress provided for licensed pilots, who may be drafted, to maintain their certificates of competency in good standing? This question applies especially to pilots holding (either of those) licenses with more than one rating. . . . Take myself for example. I now hold LC 66706 in 1S and 2S land ratings. At present I am working on my commercial and hope to have this license, with the same ratings, by registration day. If I am drafted I will immediately be put in a financial position that will make it impossible for me to maintain my certificate. Under C.A.B. regulations I must fly 10 hours each in 1S and 2S landplanes every six months to have my license renewed. Since 2S time costs from $10 to $20 an hour, it is obvious that this would be impossible with the income of $140 I would receive for the first six months as a draftee.

This whole situation is the direct result of the neglect of the administration to provide some special course of flight training for draftees who now hold certificates of competency. . . . I believe myself, as well as many others, will be forced to desert the U. S. and enlist in the R.C.A.F. unless some provision of this sort is made. . . .

CECIL W. GELDBAUGH.
Painesville, O.

● Off-hand, we think Reader Geldbaugh's wrath a bit premature. How does he know that the Government does *not* plan to use all holders of certificates of competency as pilots in some phase of our military setup? His point is well-taken and should be given careful consideration. But let's wait to see whether or not his proposed action will be necessary.—Ed.

Adventure
Sirs:

Received the flight calculator and magazine the other day and like them very much. Regret, however, that you did not have the idea a year ago, for about that time I had a lot of use for a calculator.

Last September I talked the C.A.A. inspector out of private license No. 48899 and, feeling quite capable with 60 hours behind me, I decided to take the wife and a "50" Taylorcraft to Florida. I was aware that my cross-country was very lim-

(*Continued on page 64*)

I Learned About Flying From That!—No. 20

The author in the uniform of a pilot for the old American Airways.

This pilot thought he knew more about the weather than his line's competent meteorologists. What happened to him makes some hair-raising reading.

by
PAUL V. GUSTINE

Paul V. Gustine, 46, former pilot for Standard Airlines, in turn to become American Airways and American Airlines, was born in Detroit, Mich. He attended grammar schools there, then completed his education at Cass High School, Detroit.

While still in high school he became interested in dramatics. On graduation, he entered the theatre with a serious desire to become an actor. He joined a stock company in Detroit in 1916, came to California a short time later and became successful as a motion picture actor.

His wife's illness forced him to go to Arizona in 1922. Casting about for something to do, he discovered flying. He soloed at Douglas, Ariz., that year after eight hours of instruction from the famous Charlie Mays, who learned to fly by teaching himself on an old Standard. From 1922 until 1928 Gustine barnstormed Arizona. In 1928 he joined the Standard Airlines organization and remained with the company until 1933, when the air mail contracts were cancelled. In 1933 he returned to motion pictures and has been a "bit" player and character actor since.

He still manages to keep all his ratings. He has done considerable flying for motion pictures during the past seven years, often takes charter work and on Sundays operates several airplanes for Paul Mantz' United Flying Services at Union Air Terminal, Burbank. Few passengers who take the $1.50 sightseeing hop in a Ford tri-motor on Sundays realize that they are flying with a real Ford veteran.

ALL over the United States today eager young men who are finding their wings —thousands of them—are studying weather maps. They appear quite complicated with their isobars, isotherms, Beaufort scales of wind velocity and the darkened patches which mean rain and trouble. Not only do they seem complicated but remote, what with the bright sunshine giving perfect flying weather, birds singing in the trees and nary a cloud in sight. No, I don't blame the lads for letting their attention stray from the instructor who is telling them that when the isobars are close together the storm is apt to be violent. But I do suggest learning how to read a weather map in the first place—and paying attention to all weather maps for the rest of that flying career.

After reading and digesting one, a fellow should believe it. I say that because one time, when I was captain pilot of an airliner, I didn't—

It was CAVU at El Paso, Tex. It was about one o'clock—a few minutes before take-off. I was skipper of a westbound Fokker F-10, powered by three Pratt & Whitney *Wasps*. The year was 1931. I had, at that time, around 6,000 hours. I had had most of this time in the vicinity in which I'd been flying. In fact, I'd learned to fly in Arizona, a couple of states away. Sure, I knew all about weather in the southwest portion of the United States. You couldn't fool me, not shortly before one o'clock in the afternoon of an August day.

My co-pilot, Rudd, and I were getting ready to climb into the old Fokker when the dispatcher called to me.

"Get a load of this, Gustine," he said, indicating the weather map. "There's a storm between Douglas and Tucson. It's moving east. The funny part of it is that the isobars are so close together, which indicates that it's pretty violent. Not only that, but the isotherms—the lines of equal temperature—do c r a z y things. Fellow, you're apt to run into snow."

I laughed. "I've been flying this country for nine years," I replied, "and I'm still

waiting to bump into a snow storm in August. Hell, man. It's a hundred degrees in the shade right now!" I mopped the perspiration from my brow.

"Okay, wise guy," said the dispatcher. "Here's your clearance. You can go through with your co-pilot, your mail and your express. But the passengers stay on the ground."

Very nice, I thought. The airline was being run by a bunch of sissies. I gave a last contemptuous glance at the weather map, decided that an old-fashioned almanac would be just about as good, and Rudd and I took off.

"Nothing to worry about," I told Rudd. "The storm's moving east. If it's between Tucson and Douglas, it has to be moving east. We'll get into Douglas before the storm gets there. We'll stay on the ground until it clears to the north, and then fly northwest to Tucson without any trouble. We probably won't even know it's around."

In those days there were three emergency fields between El Paso and Douglas —Columbus, Hachita and Rodeo, all in New Mexico. As usual, I flew south of them on the day run. I didn't think I'd need them. I cleared Columbus. Things were getting a little muggy but I didn't pay much attention. I cleared Hachita. There was a ceiling—one of those high, thin, gray ominous babies. I was south of Rodeo and east of it when the storm struck. Just about 60 miles out of Douglas. Ahead of us lay mountains about 7,000 feet high. The thing slammed into us so suddenly it was unbelievable. Rain lashed the ship in torrents. The radio went haywire. For the rest of our wild journey we heard Douglas and Tucson appealing to us frantically in lulls between static. We never got complete sentences. We heard:

"Douglas to Gustine—" "Tucson to Gustine—" "Gustine—reading—let us know—"

We were firing back at them and getting just enough to let us know that we weren't getting through to them. It was that way for the next hour.

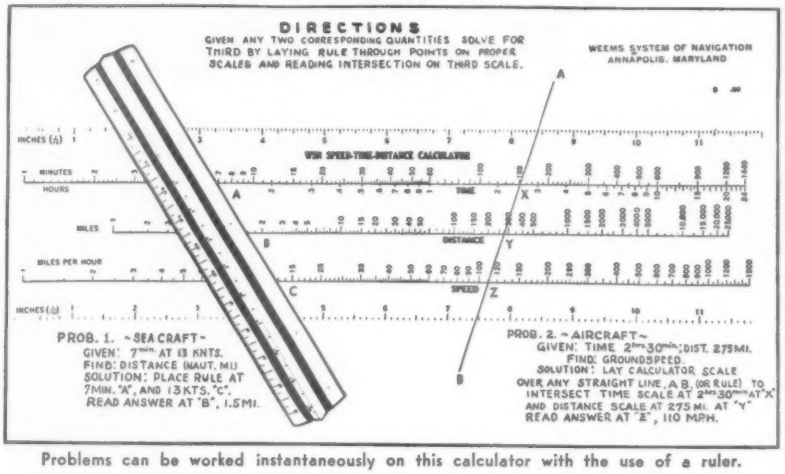
The minute the storm hit I started up. With those 7,000 foot mountains ahead of me, I wanted 8,000 or better. Maybe you've been in a Fokker F-10 during a violent storm and know the fear engendered by creaks, groans, clatters and twists. If you haven't, maybe you've been in a wooden hulled vessel in a severe storm at sea and have felt the same frightened creaks and shudders and complaints. The first thing to do in a Fokker was to slow down when you hit anything like that. You wanted to be sure the plane stayed together and wide open throttles didn't help.

I got the 8,000. It was like going up steps. The ship leaped, tossed and twisted. We connected with a windshift that would tear the plane to pieces I was sure. I began cursing myself. I began to realize that the dispatcher had been right in believing the weather map, in reading trouble into those tight isobars and isotherms. A smart guy would have paid attention to those little telltale signs on that simple piece of paper.

There was no use heading north and east towards Rodeo. That field was smothered in storm. There was no use trying to get into Douglas because the storm would be

(*Continued on page 60*)

A New Calculator


DIRECTIONS
GIVEN ANY TWO CORRESPONDING QUANTITIES SOLVE FOR THIRD BY LAYING RULE THROUGH POINTS ON PROPER SCALES AND READING INTERSECTION ON THIRD SCALE.
WEEMS SYSTEM OF NAVIGATION ANNAPOLIS, MARYLAND
WSN SPEED-TIME-DISTANCE CALCULATOR
INCHES (A)
MINUTES
HOURS
TIME
MILES
DISTANCE
MILES PER HOUR
SPEED
INCHES (B)
A
B
C
X
Y
Z
PROB. 1. ~SEA CRAFT~
GIVEN: 7MIN. AT 13 KNTS.
FIND: DISTANCE (NAUT. MI.)
SOLUTION: PLACE RULE AT 7MIN. "A", AND 13 KTS. "C".
READ ANSWER AT "B", 1.5 MI.
PROB. 2. ~AIRCRAFT~
GIVEN: TIME 2HR 30MIN; DIST. 275 MI.
FIND: GROUNDSPEED.
SOLUTION: LAY CALCULATOR SCALE OVER ANY STRAIGHT LINE, A B, (OR RULE) TO INTERSECT TIME SCALE AT 2HR 30MIN AT "X" AND DISTANCE SCALE AT 275 MI. AT "Y"
READ ANSWER AT "Z", 110 MPH.

Problems can be worked instantaneously on this calculator with the use of a ruler.

IN the line of navigational gadgets there comes to view a new one that would seem to distinguish itself from the ordinary gadget classification and to the pilot-navigator, and has a fair chance of putting itself on the indispensable list.

A time-speed-distance calculator certainly is not a new idea. Every navigational computer has such a feature; circular slide rules and scales of every design are on the market. Few, however, are accurate, nor are they consistently inaccurate. They normally are made up of discs, one rotating on the other, and, unless manufactured and centered with great precision and consequent high cost, the result is inaccuracy to varying degrees. There now is available such a calculator that is inexpensive and yet has none of the features resulting in inaccuracy. Being a one-piece affair, with no movable parts and made of transparent material, the device is the ultimate in simplicity of operation. This calculator—called the WSN (Weems System of Navigation Speed-Time-Distance Calculator) consists of three logarithmic scales on a transparent plastic: one scale for time (in hours and minutes, one for distance and one for speed. Any desired unit of distance may be used, from miles to kilometers. The transparency feature permits the calculator to be used directly in conjunction with the chart or map, although it does not require it. Any straight line may be used to pass through the two known quantities on the scales. The answer is read directly on the third scale at its intersection with this same line for the desired quantity to be determined.

In addition, the calculator has unit scales in inches at the two edges. This lends it secondary features of usefulness in providing means for laying courses or solving wind velocity problems. The illustration above shows the calculator, with two problems solved as examples of its work.

Alaska Game Planes

PILOTS for the Alaska Game Commission recently took delivery on two new Fairchild cabin planes to be used by that organization throughout the Territory. They will be based at Juneau and Fairbanks. The two Game Commission pilots who picked up the ships at the Fairchild factory, Hagerstown, Md., were Sam White and Ray Renshaw. The Alaska Game Commission, a branch of the Department of the Interior, uses aircraft for game surveys, locating mission herds and patroling the Alaskan interior in search of poachers. In winter months these ships can do invaluable service in dropping forage to snow-bound wildlife.

Below are the Alaska Game Commission's new Warner- and Ranger-powered Fairchilds.

WANT A JOB

by WILLIAM HURD BARRETT

IT'S rather hard for us to start in on a thing of this sort, from scratch, because we can't know exactly—and won't, unless you tell us—just what jobs you are most interested in. Our purpose, of course, is to try to help you fit yourselves for whatever jobs in the aircraft industry you're looking for. With this in view, we're going to list the requirements for special work in all branches of the industry—flying, as well as ground—so that you can check them against your qualifications, and see where you think you'd fit in best.

Right now, in the absence of any specific inquiries, we're going to cover the key job in the manufacturing industry—the one in which it's easiest to find employment. Remember, though, that there are thousands of other men looking for this same type of work, and don't be immediately discouraged if you fail to land something good. Remember, also, that no employment manager is interested in anything except the concrete qualifications you have for the work you are to do. Employment managers have a tough life. Their jobs depend on their ability to hire suitable men. If they don't hire them, they lose their jobs. They aren't interested in your personal life, your ambitions, or how badly you need the work. They *are* interested in your qualifications. And—if you can fill a job they have open—they'll be tickled to hire you.

In this connection we think it would be a good idea for you to take these job analyses with you when you go to apply for work. Check off the qualifications you actually have and show them to the personnel office interviewer when he talks to you. This will help both him and you. Don't worry too much if you are short on some of them. Sometimes they need men badly enough to make allowances. Remember another thing, too—and this is important. An unskilled, inexperienced man can *not* get a job by writing a letter of application. He will have to apply in person at the company's employment office.

It doesn't hurt, incidentally, to know someone who works for the company to which you are applying. A note from him will often help to break the ice. If you actually have the qualifications, the company will be grateful to him. If you haven't the qualifications, however, and he does recommend you in spite of that fact, you will not get the job—and his recommendation of you may mitigate against him with his bosses. You can see why that is. If he recommends you and you can't fill the bill, his superior will have the tendency to doubt his good judgment after that. Don't hesitate to ask a friend for help in getting a job—if you're sure you can do it. But don't put him on the spot.

The basic job in the mechanical end of an airplane factory—the one that requires the least skill, and hence is the easiest to get—is that of junior riveter (riveter's helper). A junior riveter, usually starts in bucking rivets with a partner who is more experienced than he is; the reason such work is easy to get is that an unskilled man can usually qualify for it by taking a trade school course in aircraft sheet metal from one of many excellent schools. Such a course will take from three to six weeks to complete and may cost anywhere from $75 to $150. Reputable schools will usually try to place their graduates, although they naturally can't guarantee employment. Here follows an outline of the work a riveter's helper will be expected to do.

Job Analysis

POSITION: Major or minor assembly riveter, helper.

WORK DONE: Riveting assembly of major or minor aircraft assemblies (wings, fuselages, tail surfaces, seats, nacelles, etc.). Does not require a knowledge of blueprint reading. Does not require any specialized knowledge of mathematics or of sheet metal layout, although this is desirable. Must use standard hand tools, including electric drill, electric extension drill, pneumatic or one-shot riveter, hand rivet-squeezers, screw driver, etc. Must know the principles of aircraft construction. Should be of careful disposition, since the quality of his work is important to the appearance and quality of the finished aircraft.

PROMOTIONAL FROM: Starter's job.

WAGES: From 45 to 60 cents per hour, depending on the plant and the section of the country in which it is located.

EDUCATION: High school graduates with mechanical and mathematical training are preferred, although persons with lesser educational advantages are acceptable.

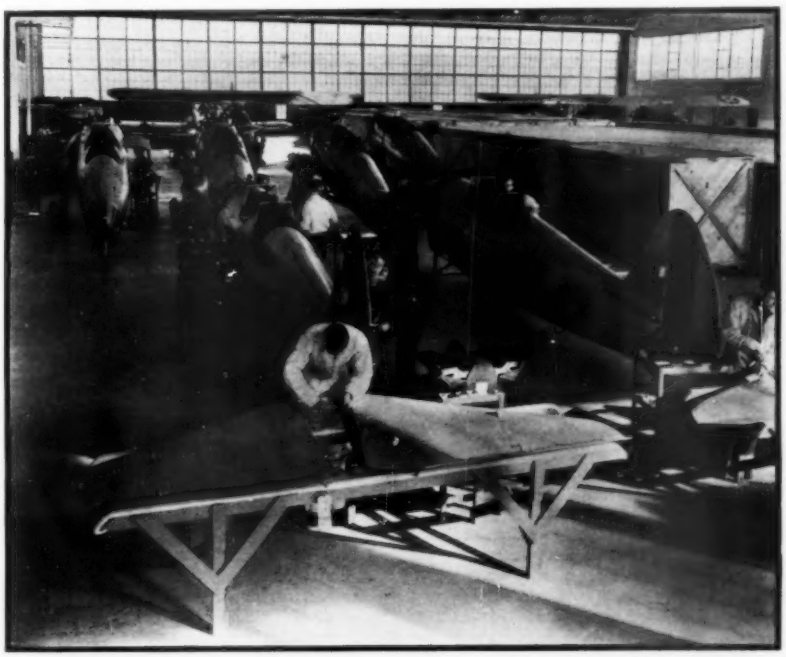
EXPERIENCE: Should have had trade or high school training in the use of the tools above mentioned. While no previous experience is required, as such, men with riveting or practical trade school experience in this work are preferred.

POSSIBILITIES FOR ADVANCEMENT: May become a senior riveter, skin fitter, assemblyman or bench mechanic. Some plants require that one class of workmen do all of these operations. Others, use riveters, assemblymen and skin fitters as such. Most trade school courses give basic training in all of these fields. Graduates can qualify as helpers in any one of them.

This class of job constitutes roughly 60 per cent of the actual mechanical help in an aircraft factory. That is to say, a person who can qualify as a riveter's helper, can usually also fill such jobs as the following:

1. Sheet metal fabrication, helper.
2. Sheet metal layout, helper (from templates).
3. Gang-drill operator (from template).
4. Casting filer.
5. Bench-assembly mechanic's helper.
6. Template maker's helper; and
7. Many other types of work requiring a basic mechanical training similar to that described above.

Promotion from this class of job depends on mastery of such subjects as sheet-metal layout, sheet metal fabrication technique, and the use of sheet-metal machine tools. Advancement depends also upon adaptability to mechanical work. Many men find they can do good jobs as helpers but cannot seem to advance to the better paying senior mechanical jobs. As a rule, this is because they have no mechanical dexterity. Such men are often admirably suited to factory clerical work, stock-chasing, or some similar form of activity where the familiarity with mechan-



In applying for work at an aircraft factory be sure to show the personnel man who interviews you all your qualifications for the job sought. This is helpful to both.

ical work they have gained as helpers stands them in good stead. If, after six months in a job such as we have described above, you have not made the progress you feel you should have made, have a talk with your foreman or assistant foreman. Often he will be able to tell you how you may get into work that is more congenial to you and to which you are better suited.

Next month we will try to cover the requirements for junior draftsmen and for what the industry calls clerical workers, although the latter is really a misnomer. Clerical workers do much of the most interesting, exacting and lucrative work in an airplane factory.

* * *

We started on riveters' helpers because, as we said, it's the easiest job to secure in all the aircraft industry. The industry as a whole, however, presents a hundred and one different occupations—and a thousand and one subdivisions of these occupations. And we don't believe that the majority of men looking for work in the industry ever take the trouble to explore its possibilities.

Previous experience in other lines will often qualify a man for work in aviation. Take the air transport industry, for instance. Most men think of it as requiring the services of only pilots and mechanics. This is not the case. Airlines use all types of office workers, as well as experienced traffic men, accountants, lawyers and draftsmen. Similarly, they have purchasing offices, stock rooms, receiving departments, shipping departments and almost all of the functions of other industries. Men who have had experience as shipping clerks in, for instance, the widget industry, should have no trouble whatsoever in adapting their skills to air transport.

* * *

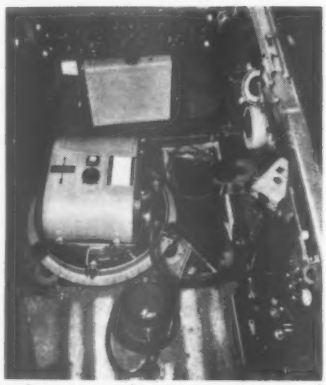
With respect to this, we might mention the case of the older man. Most men over 40 consider they are laboring under a handicap when they try to get a job. While this is in a measure true, there are many types of work in the industry in which older men are preferred by employment managers. This is why.

Just imagine for a moment that you are chief stock keeper of an aircraft factory. You will have hundreds of thousands of parts flowing through your stock rooms, each of which has to be classified, stored, distributed and replaced when it has been used. A running inventory of parts on hand must be kept; each part must be requisitioned out and each requisition must be checked for proper signature, then entered against the running inventory. Parts must be stored in the bins to which they are assigned and so on.

All this requires detailed paper work and experience shows that detail is not youth's strong point. Most young men are impatient of detail and very few of them make good stock keepers.. That is why many employers keep their eye out for older men who have had experience in similar lines of work. A man who has spent his life clerking in a grocery store can readily accustom himself to handling wing ribs or electrical conduits instead of soup or canned peas. The theory is the same—and if he is a careful man, age will

(*Continued on page* 70)

New German Trainer



The German air force's newest trainer has retractable gear, odd vanes on propeller hub. Directly above is camera installation in ship.

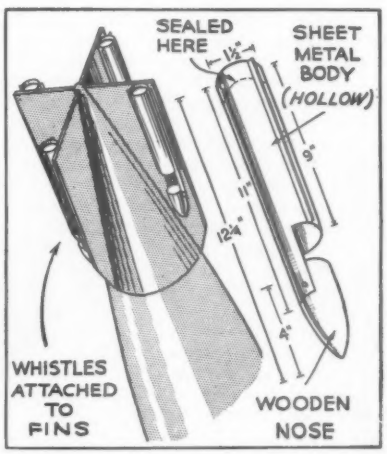
CURRENTLY in use by the German air force as a medium powered trainer is the Arado-Ar-96B illustrated here. Actually, the plane is being used as a six-purpose machine with the majority of its work in the training field. In addition to flight training, the Ar-96B is used for training in aerial machine gunnery, bombardment, photography and radio. At the left is seen the camera installation. According to FLYING AND POPULAR AVIATION'S correspondent, this machine also has been used as a short-distance reconnaissance machine, light fighter and police plane.

The Ar-96B is a low-winged, all-metal cantilever monoplane and is powered with a 12-cylinder Argus engine of 450 h.p. This is the engine's maximum available power; maximum power output at 9,800 feet is 360 h.p. The instructor and his student sit in tandem in a sliding-hatched cockpit. Top speed with a full load is 211 m.p.h., while its cruising speed is 168 m.p.h. Maximum diving speed for which the ship is stressed is 435 m.p.h. Landing speed is 63 m.p.h. Range is 670 miles. Span of the slotted wing is 36 feet, length of the fuselage is 30 feet and the overall height is 8.7 feet.

The Ar-96B is reported to have been chosen as the latest standard trainer of the German air force. There is some reason to believe that several of these ships also have been used in actual combat work. German literature on the ship says in part: "Thus, quite apart from the advantages of the all-metal construction, *as proved in actual fighting*, the machine possesses very valuable economic properties for a flying school." The Ar-96B is only lightly armed: one machine gun, with 500 rounds of ammunition, firing through the propeller, and one flexible gun with 375 rounds for the second member of the crew. The ship also is equipped to carry three 22-pound bombs "for diving attack," according to the German report.

Hitler's Scream Bomb

THE drawings at right show the famous German screaming bomb and just what makes it scream. Adapted from the Canadian "Air Force Review," the drawing farthest right shows the construction of the simple whistle. The other drawing shows four of these whistles attached to the fins of an aerial bomb. According to the "Air Force Review," the screaming bomb was used by the Germans in the last war. The noise is achieved by the air screaming through the bomb's four whistles as it falls earthward. Commenting on the use of screaming bombs, the Canadian publication says: "That such devices exist prove that Germany always intended to demoralize the civilian population. They could be of no effective use against a legitimate military objective." Also widely used by dive bombers, the Canadian publication adds, are ordinary sirens that shriek in the slipstream as the bomber dives.



AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

MONTHS ago, AOPA started a vigorous campaign to call the attention of Government officials to the vast potential numbers of non-skeds who were experienced pilots but who had never had aid or assistance from the Government. This great body of pilots, we argued, could serve as basic material for home defense or, with proper orientation courses, might qualify as first line pilots—a form of civilian air reserve.

For many reasons—some of which may never be known to us—the CPTP program and other pilot training courses of the various Government branches omitted consideration of this important group of licensed civilian pilots, most of whom acquired their flying experience the hard way—and at their own personal expense.

We felt so strongly on this subject that we decided to bring the problem to the front by the formation of the Air Guard, a voluntary course of instruction compiled by the AOPA with the aid and assistance of military officials and entered into by individual pilots at their own expense.

Several hundred pilots started the one-star course, a streamlined version of the Air Corps' Series 10 extension course given to reserve officers. Next, the two-star course was completed by many. This was a 20-hour military orientation flying course. Our Air Guardsmen soon further qualified themselves by working with National Guard and regular Army ground forces in joint maneuvers. These Air Guardsmen scored well—so well, in fact, that the truth started to leak out—these non skeds with a little training had a potent value in a military organization.

Soon after the AOPA's Air Guardsmen had thus demonstrated this vivid picture other organizations came to our support. The NAA, its various offsprings and departments supported these efforts, as did many others. A program was submitted to the National Defense Advisory Commission and the War and Navy Departments.

Lawrence Sharples, of AOPA's executive board, was asked to join other aviation heads composing the Civil Aeronautics Administration's newly formed Aeronautical Advisory Council. There this whole matter was for the first time given official hearing. The Government has recognized the merit of the Air Guard and, at this writing (October 18) it looks as though the Government may take the whole job over, put proper financial aid behind it and assist non-skeds in the matter of their getting flying time. We feel that this would be a great step forward as, with complete Government backing and large Government appropriation, the military training of private pilots will go much further and faster than under AOPA's sole guidance.

It is probable that such a Government-sponsored program would incorporate a change of name to one such as "Civilian Air Reserve." Within 60 days of this writing formal plans are expected to be ready. We expect to give every assistance to this enlargement of the Air Guard idea and expect that AOPA Air Guardsmen will be able to assist in their respective localities. Air Guardsmen will be kept intact. AOPA's Emergency Pilot Corps, a file of civilian pilots who have indicated their willingness to serve in event of national disaster, also will be kept intact, as we have had many calls for flying medical supplies to rural areas, etc., and can probably continue to offer a valuable service in this manner.

The Government-sponsored program will act as the official national defense auxiliary, probably having a headquarters group in each state with local airport activity. Preparations and training will probably continue the Air Guard pattern to serve for non-combatant patrolling, transport, reconnaisance, mapping and disaster relief.

Booster Campaign

The BM (booster-member) campaign has started and looks as though the AOPA will be awarding a good many BM wrist tags to our members. The campaign is a contest for members. Every registered member who obtains *five new members* is sent, without charge, one of the new AOPA identification wrist-tags. This bracelet has the AOPA wing and insignia embossed on the top and carries the member's name and AOPA registration number die-stamped into the metal and filled with enamel—a smart-looking yet conservative wrist-tag. Members should be sure that their name and the initials "BM" are affixed to the bottom of the new applications when sent in, otherwise we will be unable to properly credit the application toward the wrist-tag award.

Hardly had news of this booster-member campaign left our office when things started to pop. Even before we had seen the finished lead die proof of the wrist-tag design, members' names started appearing on the application blanks. We have just given the names of 17 members to the jewelers for BM awards. Remember, your participation in this BM campaign means much more than the mere winning of this AOPA identification bracelet; it means that AOPA pilot registration has been increased and that *we will therefore be able to give that much more service to our membership.* We know that it probably would never happen, but—just think—if each member qualified as a BM *our strength would increase five times overnight!*

Fixed Base Operators, Attention!

Recently, AOPA designed a special Certificate of Award for fixed base operators to use in conjunction with their student training. Operators and instructors have asked us many times for something to award to their students on the occasion of their solo flight. Now available is a handsome scroll, suitable for framing, which has spaces for the name of the student, the date and airport from which the solo flight was made, the license number of the aircraft and a place for the signature of the instructor or witness. On the left hand corner is also a space for the AOPA corporate seal which authenticates the document and a space for the AOPA registration number of the pilot as well as additional spaces when the pilot qualifies for his private and commercial tickets. Write to the Chicago AOPA office (Transportation Building) for a sample of this certificate. We think your solo pilots will be greatly pleased to have this certificate, signed by you, awarded to them on the occasion of their solo flight. *Price is very nominal to operators.*

Reduced Tickets for Members

From AOPA's New York office comes

This AOPA breakfast flight at Philadelphia's Aviation Country Club drew 82 airplanes and 160 pilots representing seven states. This was the largest such flight in the area.

word from "Doc" Hartranft, executive secretary, that the AOPA has made tentative arrangements to have a "pilot's rendezvous" booth at the forthcoming Eastern Light Airplane Exhibition held in conjunction with the National Sportsmen's Show, Grand Central Palace, New York City, February 15-23, 1941.

In addition to the booth, which is being installed by the AOPA for the convenience of visiting pilots, tentative arrangement has been made whereby all registered AOPA pilots may obtain tickets for the airplane exhibition (including the Sportsmen's Show) at a reduced price of 55 cents (regular price 75 cents). Tickets may be obtained by writing the New York AOPA office. Or pilots may, by presenting their registration cards at the information window in the lobby of the Palace, secure tickets at a special reduced price.

The entire third floor of the Palace is to be turned over to the aircraft exhibit this year. AOPA will have a guest pilots' register. All pilots are urged to sign this visiting pilot's book, which will have a space for the recording of out-of-town pilots, a convenience to those persons who may wish to locate their pilot friends at temporary New York addresses. Pilots—plan to meet your friends at the AOPA booth when you visit the show.

Private Airports

Larry Lawver, AOPA's executive assistant, reports that inquiries on the subject of private airport construction are increasing. We are preparing an outline for the proper procedure for the survey, construction and maintenance of small airports. This will be available to all persons who are interested in establishing airport sites in their communities. This is a timely and worthwhile project since there is now a great shortage of airport facilities especially in most large city centers.

The design of AOPA's AIRHAVEN is also now available for those who are interested in this type of private landing strips surrounded by homes. Copies of both of the above may be obtained by writing to the Chicago office of AOPA. Non-members are requested to provide stamped-addressed envelopes with their inquiries.

For Non-member Pilots Only

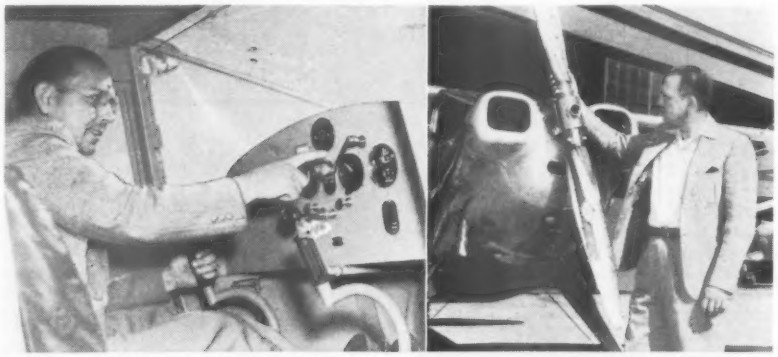
Why should you join the Aircraft Owners' and Pilots' Association? Let's get right down to cases—hard facts. You are one of approximately 41,000 licensed civilian pilots. You are one of the 41,000 plus "non-skeds" who fly more hours per day, use more airports, cover more miles per day than any other division of aviation. All we "non-sked" pilots fly more airplanes than all the airlines and military forces combined.

We are the real American flying public!

Although we, *as a group*, represent all these things, it is a tough ball game when we bat it alone. Federal monies are being poured into airline airports—from which we are often barred by landing fees or other devices, multiplicity of unnecessary regulations which hinder or prevent our aviation growth, prohibitive insurance, aviation gasoline taxes that, many times, build highways for motor cars rather than airports for the planes we are flying, storage rates—but we need not go on for you know the conditions as well as we.

(*Continued on page* 64)

Lightplane Controllable Propeller



Crank on plane's dash operates propeller. Below and right is close-up of prop hub.

WHAT bids fair to be the answer to the lightplane owner's prayers is a new controllable-pitch propeller recently demonstrated in Wichita, Kan., by its inventor, H. H. Roby. The propeller is entirely mechanical, requires no servicing other than lubrication every 25 hours and adds only three pounds to the weight of the ship. According to Roby, the lightplane's take-off and climb is improved about 50 per cent. It also is reported to add almost 20 m.p.h. to the ship's performance. At this writing the Roby propeller is awaiting its ATC. It is expected to sell for $150 and will be manufactured in Wichita.

Tough Bomb Door

TECHNICIANS of the Glenn L. Martin company have developed a new bomb-bay door for the Martin bombers now in production for Britain (and soon to be for the U. S.). The door is novel in that it is so light the two girls pictured below can carry it with ease; it weighs but 41 pounds, yet is stressed to bear more than 3,000 pounds. Developed by Reid B. Gray, Robert L. Hildebrandt and George W. DeBell of the Martin laboratories, the new doors are made of a special kind of plywood combined with a light plastic material. Weight-saving devices like this are important to high-performance warplanes like the Martins. The development of this bomb door alone can add several gallons of necessary fuel to the ship's range, or additional defensive armament or bomb load that may be the decisive factor in a fight.

Girls below are holding 41-pound, 14-foot wood and plastic Martin bomb-bay door.

500 MILES—AND FASTER

by RAOUL J. HOFFMAN

AFTER the Wright brothers demonstrated the first successful airplane with a speed of 35 m.p.h., pilots started to make changes to increase this speed. Shortening wing span, increasing engine output and streamlining the pilot's compartment were some of the means to obtain better results.

The first completely enclosed fuselage was the Nieuport monoplane sketched in Section 3. In order to reduce resistance, the cockpit was closed up by lacing a canvas cover around the pilot's neck. To prevent damages of the wings by the too-soft spring steel landing gear, they were equipped with metal tips.

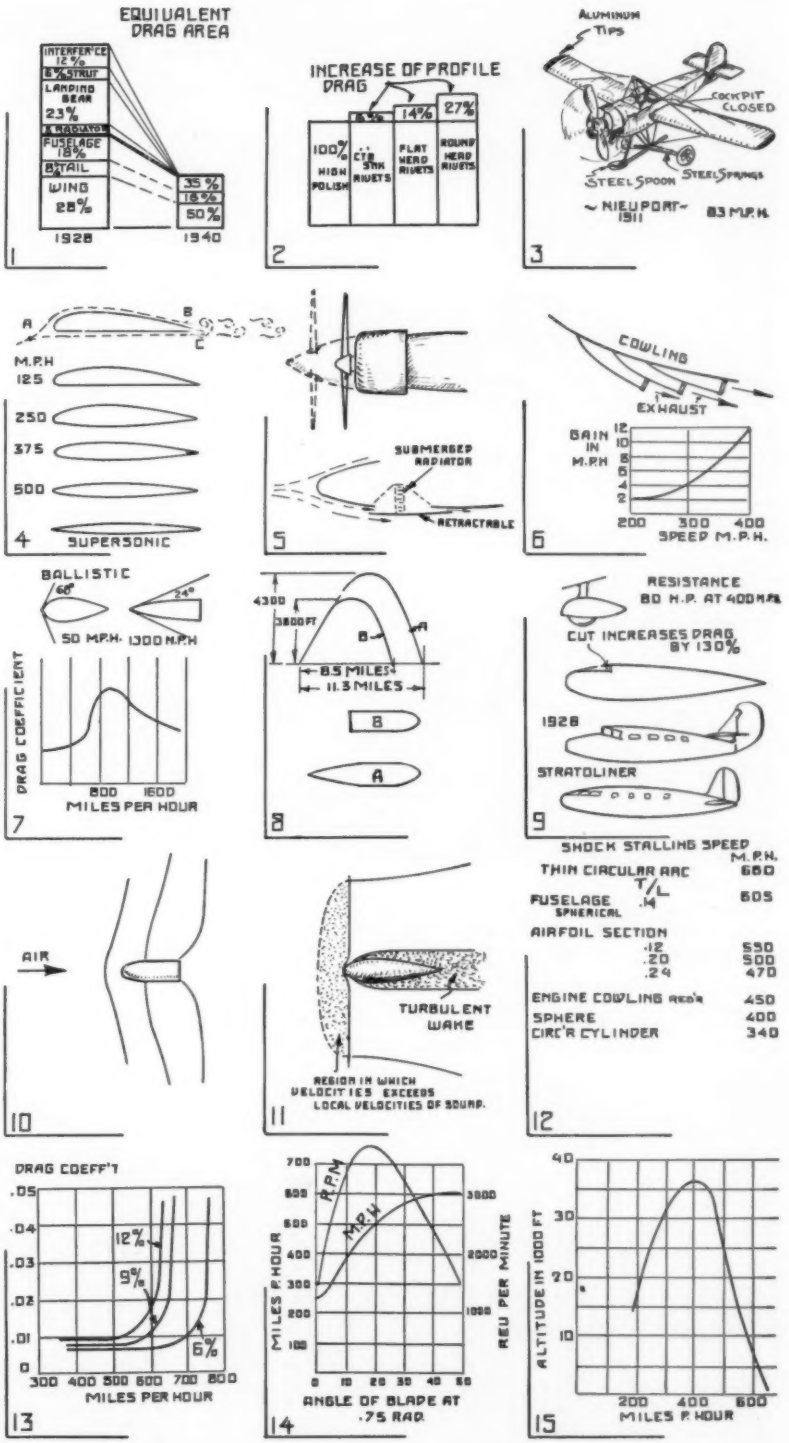
From then on it has been a steady contest between airplane and engine designers. Usually the minimum diameter of the engine settled the diameter of the fuselage. At present, however, with motors placed in the wing, the size of the fuselage may depend on the outline of the pilot. This reducing of the size of the fuselage created the "flying pencil" designs. It is even suggested to use pilots of short statures to fit into extra small diameter fuselages for combat planes.

The distribution of the resistance of an airplane of 1928 and one of 1940 is shown in Section 1. It shows that, in the 1940 design, many items creating resistance were eliminated by better design or by retracting them into the structure. This left only three items creating drag: wing, tail and body. Wings were partly retracted by telescoping them laterally into the wing or fuselage. The most successful design is to retract part of the wing into the lower rear section of the wing, as used in the Fowler flap design.

Not much success has been made retracting tail surfaces. Retracting the gunner's dome or closing a trapdoor, however, will add from 5 to 10 miles to the top speed of an airplane. Every unit exposed to the airstream must be smoothed to prevent turbulence. A graph in Section 2 shows the increase in resistance as the rivet heads increase in height.

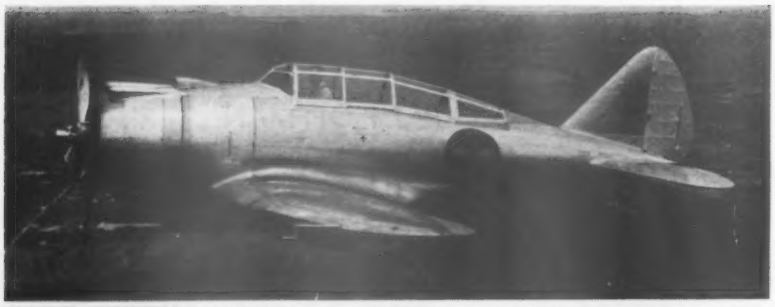
Disregarding the theoretical resistance of the air deflected downwards—which is small at high speeds—the resistance is created by the friction of the air passing over the exposed surfaces and by the parting of the air by the wing or body. The upper sketch in Section 4 illustrates the bisecting of the air by an airfoil. One part moves from A to B over the upper surface and, in the same time, the other part moves from A to C over the lower surface of the airfoil. It is obvious that they do not meet at the trailing edge. Therefore the lower flow will spill over to the upper surface and create turbulence. Naturally, these were beneficial at certain low-speed airplanes. With advance in top speeds the turbulence had to be reduced by equalizing the distances over the upper and the lower surfaces. A few examples of airfoil sections adapted to certain speeds are pictured in Section 4. It seems that for speeds above the velocity of

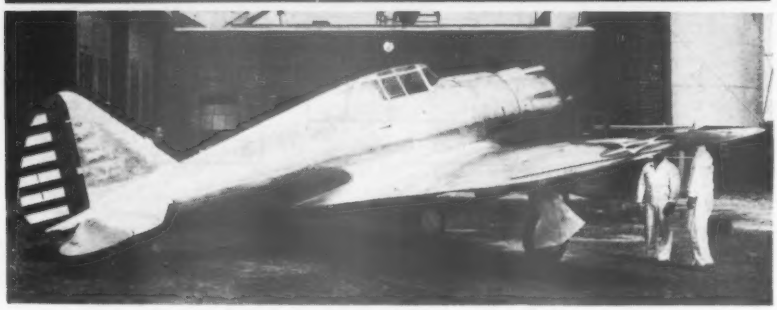
(*Continued on page* 81)



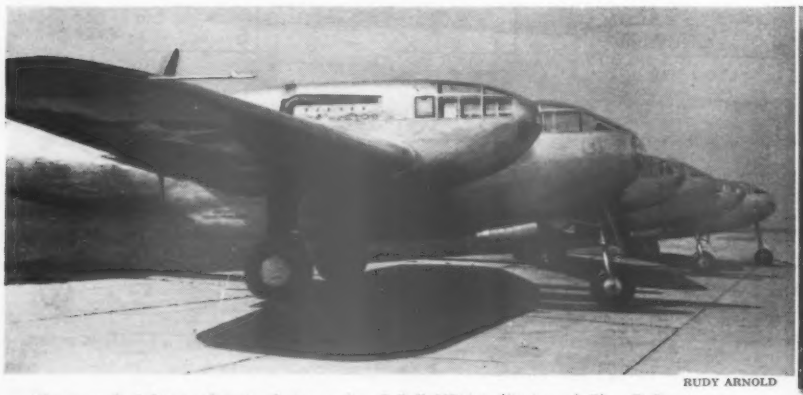
These diagrams illustrate many of the theories behind the flight of aircraft at very high speeds.

HAVE YOU SEEN ?





Two new Republic warplanes are the "Guardsman," originally for Sweden and now going to Britain (top); and the YP-43 for the U. S. Army. Former is powerful dive bomber.



RUDY ARNOLD

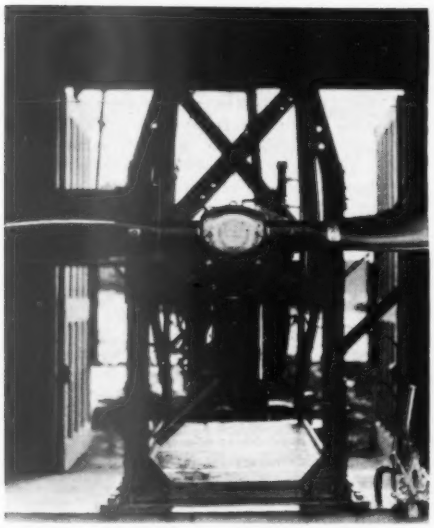
Above and right are latest photographs of Bell YFM-1 ("Airacuda"). Deliveries now are under way to the Army Air Corps. Ships above are not equipped with cannon. Novel "stairstep door" at right is a Bell innovation. Top speed is approximately 360 m.p.h.

General Motors is experimenting with two-cycle aircraft engine in Cessna below. Engine is water-cooled and develops 180 h.p.

Described as "superior in performance and armament to the 'Stuka' " is new Douglas SBD dive bomber for Marines and Navy.

New observation plane being tested by Army Air Corps is Stinson YO-54, a conversion from the "105" lightplane. Another Stinson is the O-49.

Lockheed flying beside Army BC-1A's at Randolph Field is camera plane filming scenes for "I Wanted Wings."



Algarsson constant-speed propeller is new Canadian design. Erco labels on blades are from American company that also manufactures the Ercoupe.

BELDEN

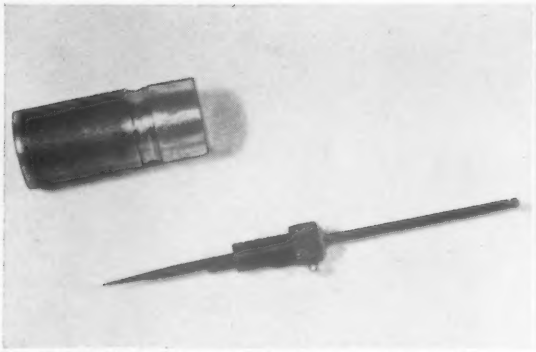
Experimental engine installation above shows Kinner motor mounted on a Ryan ST (PT-20 trainer in the Army). ST also has been tested with Warner engine.

BOWERS

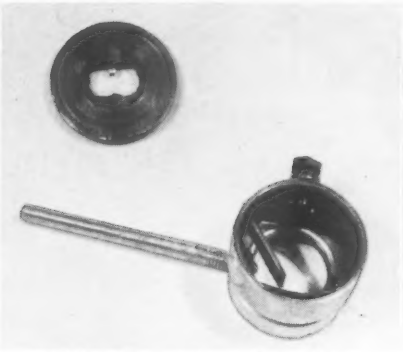
Recently delivered to Navy and Marines are Douglas R3D-2's (DC-5). Work on commercial version of this ship has been laid aside indefinitely, factory says.

Plane wrecked on ground by Nazi bombers in France (below) is not a warplane but actually a British Armstrong-Whitworth "Ensign" airliner. Unusual landing gear arrangement (left) positively identifies wreck as Imperial Airways liner, not a bomber.

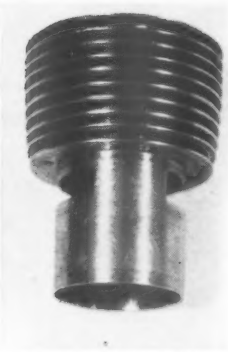
ACME



Crankshaft bushing and adjusting gas valve needle.



Ignition timer and propeller washer.



The completed cylinder.

THIS MONTH'S MODEL

by PAUL W. LINDBERG
Model Editor and Designer

Herewith the third and final installment in the series describing the construction of a Class C gas engine. These step-by-step plans were for a new engine designed by the author.

PART 3

IN this concluding article are instructions and detailed drawings on how to finish our Class C gas motor. A change has been made in the aluminum head. It is machined from a solid bar of aluminum and is held securely to cylinder by four bolts. Reason for this change is to permit easier lapping of the cylinder. In turning the aluminum head to shape, turn the convex surface toward the cutting tool. Cut the hole for the spark plug and tap it before cutting the aluminum head from stock in lathe. Next step is to counter-drill the four holes for the bolts. Fins are then cut in on a milling machine or lathe, if the attachments are available. A hack saw will also do the trick, but in order to obtain a professional looking job, it will be necessary to do considerable smoothing between the fins.

Rear view of engine. Note gas tank.

The various steps for turning the cylinder are shown on the drawing; material used for this is ordinary cold-rolled steel. This step no doubt is the most tedious, as it requires precision workmanship. In cutting fins, as shown in the *first step*, cut a small centering hole in the end of the stock, so that the tail stock on the lathe may be inserted to prevent the piece from chattering.

Step number two is to finish the lower part of the cylinder to a one-inch outside diameter so that it will fit snugly in its aluminum casting. This fit should be just tight enough so that it can be forced into position with the hand.

Step number three is the cutting of the exhaust and by-pass slots. This operation may be done while the cylinder still is in the lathe. A hack saw and file will be the only tools necessary.

Step number four. Drill a hole, large enough in diameter, through the entire cylinder so that a boring tool may be inserted to cut the inside diameter of the cylinder. When the hole is large enough, use a heavier-duty boring tool to permit more accurate cuts. Final cuts should be made by removing a very small amount of stock, as a very smooth finish should be kept to allow the finishing of cylinder with the lapping tools. One-thousandth stock is all that is necessary to be left within the cylinder for lapping to size.

Lapping tools are made from lead and should be charged with a very fine lapping compound, which may be obtained from any garage or machine shop. Reason for using lead laps is so that the lapping material will embed itself in the lead rather than the cylinder walls. The cylinder should be cleaned thoroughly with gasoline to remove all lapping compound. The piston should be fitted occasionally to be sure of a perfect fit; the piston should rock on compression.

The main bushing for the crankshaft is turned from 17-ST aluminum. Press it into the crankcase for a tight fit. The crankshaft hole is next reamed out for a close fit. The crankshaft should revolve freely within this bushing, but there should be no play whatsoever. The groove around the bushing is to receive the adjustment arm on the timer housing. This groove also holds the timer assembly intact.

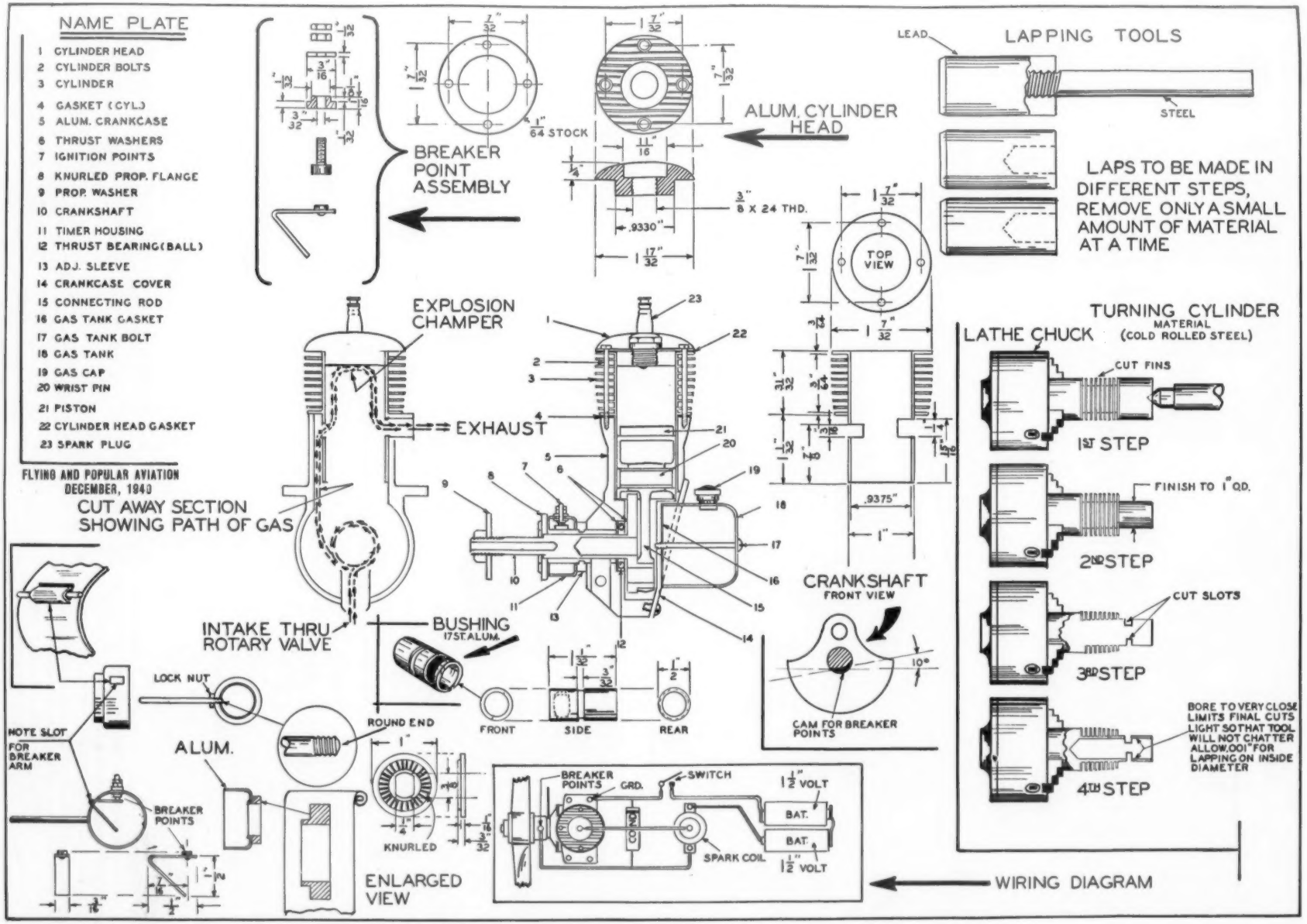
In making a timer housing, the builder has his choice of turning it in one piece or as two separate units, as shown in the drawing. The breaker arm is made from a strip of steel and hardened, after first testing it on the crankshaft to make sure the breaker points open and close the required distance. Fifteen-thousandths opening is suitable.

Other little details not explained here are clearly shown on the plan. In testing the finished motor, be sure everything is properly timed and that a good strong spark is had. Three parts of white gasoline to one part of Number 70 S. A. E. oil is recommended for fuel.

Running the motor in slowly for the first hour or two will preserve its life almost twice as long as one that has been running at top speeds from the start. If the plans have been closely followed we know you will be well pleased with the results.

END

Front view of the completed engine.


NAME PLATE
1 CYLINDER HEAD
2 CYLINDER BOLTS
3 CYLINDER
4 GASKET (CYL.)
5 ALUM. CRANKCASE
6 THRUST WASHERS
7 IGNITION POINTS
8 KNURLED PROP. FLANGE
9 PROP. WASHER
10 CRANKSHAFT
11 TIMER HOUSING
12 THRUST BEARING(BALL)
13 ADJ. SLEEVE
14 CRANKCASE COVER
15 CONNECTING ROD
16 GAS TANK GASKET
17 GAS TANK BOLT
18 GAS TANK
19 GAS CAP
20 WRIST PIN
21 PISTON
22 CYLINDER HEAD GASKET
23 SPARK PLUG
FLYING AND POPULAR AVIATION
DECEMBER, 1940
CUT AWAY SECTION
SHOWING PATH OF GAS
EXPLOSION CHAMPER
EXHAUST
INTAKE THRU ROTARY VALVE
BUSHING
17ST. ALUM.
LOCK NUT
NOTE SLOT FOR BREAKER ARM
BREAKER POINTS
ALUM.
ROUND END
KNURLED
ENLARGED VIEW
FRONT
SIDE
REAR
BREAKER POINT ASSEMBLY
1/64 STOCK
ALUM. CYLINDER HEAD
3/8 X 24 THD.
.9330"
TOP VIEW
.9375"
CRANKSHAFT
FRONT VIEW
10°
CAM FOR BREAKER POINTS
LAPPING TOOLS
LEAD
STEEL
LAPS TO BE MADE IN DIFFERENT STEPS, REMOVE ONLY A SMALL AMOUNT OF MATERIAL AT A TIME
TURNING CYLINDER
MATERIAL (COLD ROLLED STEEL)
LATHE CHUCK
CUT FINS
1ST STEP
FINISH TO 1" O.D.
2ND STEP
CUT SLOTS
3RD STEP
4TH STEP
BORE TO VERY CLOSE LIMITS FINAL CUTS LIGHT SO THAT TOOL WILL NOT CHATTER ALLOW .001" FOR LAPPING ON INSIDE DIAMETER
BREAKER POINTS
GRD.
SWITCH
1 1/2 VOLT
BAT.
BAT.
SPARK COIL
1 1/2 VOLT
WIRING DIAGRAM

The Aerial Siege of London

(*Continued from page* 13)

over any length of time. Which means that every ship should have three pilots. This margin the British did not—and do not—have. R.A.F. men, as a result, have *averaged* more than half a dozen combats a week apiece; some have fought as many as a dozen in a day. The Nazis hoped they would crack from strain and fatigue. Somehow they did not.

The number of R.A.F. pilots is not known exactly, but it is not more than 8,000—of whom about half are pursuit aviators. The *Luftwaffe* has about 25,000 pilots.

There is one compelling reason why the Nazis had to resort to wearing tactics in the attempt to cripple the R.A.F. That, very simply, is the fact that the R.A.F. has been (and is) able to achieve command of the air in a pitched battle over a limited area—an area too small for the Nazis to bring their numerical superiority to bear. It would be in such a limited theater, for example, that air action accompanying an invasion would be fought.

The British can thank their insistence on the heaviest possible armament for their *Spitfire* and *Hurricane* fighters for this ability to win local superiority. Most *Spitfires* and *Hurricanes* are armed with eight rifle-caliber machine guns and the planes are fast enough to deal adequately with the single-seat Messerschmitt Me-109, the *Luftwaffe's* standard pursuit.

Some *Spitfires* have been fitted with two 20 mm cannon and two rifle-caliber guns. These modified *Spitfires* are designed to counter the one Nazi airplane which is definitely better than anything the R.A.F. has — the Messerschmitt Me-110. The twin-engined Me-110, with its two cannon and six machine guns, is too fast and too heavily armed for British single-seaters to cope with, however, regardless of modified armament. The multi-engined "pocket battleship of the air," or destroyer plane as the Nazis call it, is definitely the most dangerous warcraft aloft.

The British have belatedly developed a twin-motored fighter of their own to match the Me-110. It is the Westland *Whirlwind*. The *Whirlwind* may be the mysterious "nighthawk" the R.A.F. sent into action early in October. But the R.A.F. has comparatively few *Whirlwinds* and the *Luftwaffe* has nearly 2,500 Me-110s. The Me-110 has been in production since the start of 1939. Yet it hasn't been enough to win the war.

At first Nazi bombers come over in massed squadrons, with an escort of one fighter for each bomber. Me-109s and Me-110s chiefly were used. Protection offered by so few fighters, however, proved to be woefully inadequate and, coming by daylight, the raiders' formations were easily broken up. The high losses that resulted (10 to 15 per cent of the German planes engaged) led to a marked change in tactics. The proportion of fighter escorts rose to as high as five to one. Since that first all-out week it has not dropped below two to one and has been that low only when the fighters in question were Me-110s. The Nazis have found that at least that many are needed to shield the bomber long enough to give it a reasonable chance to do its work and then run.

The other changes were, of course, the shift to fewer raiders at a time and more night work. The main reliance was not placed on night work until a large percentage of the Nazi pilots had thoroughly familiarized themselves by day with the British landscape. These changes all resulted in a sharp drop in the ratio of German to British losses, which have been approximately equal since the last week in August—although the figures put out by London and Berlin do not show anything of the kind.

"Pilots! Are you suffering from overacidity . . .?"

American military experts have arrived at an empirical formula for estimating plane casualties on the basis of the reports of the belligerent high commands, by the way. It's fairly complicated, but take a deep breath and read on:

To determine the number of British planes shot down take the number the British admit they lost and add 50 per cent. Then take the number of British planes the Nazis claim they destroyed and subtract 40 per cent. Add these two numbers and divide by two. For example, suppose the British admit to the loss of 200 planes over a particular period, say two weeks. Add 50 per cent: 300. During that same period, the Nazis say they shot down 600 British ships. Subtract 40 per cent: 360. Add 300 and 360: 660. Divide by two: 330—British planes lost.

The formula is applied in the same way to Nazi losses, of course. Keep in mind that this is a rule-of-thumb method of estimating and that, like any rule-of-thumb averaging method, it does not apply to any single day's action but only to totals accumulated over a period of a couple of weeks or more—and that it is only approximate anyway. But it is the best calculating method—except going out and counting shot-down planes yourself—that is known.

Both sides naturally tend to exaggerate the other side's losses and to minimize their own, with the Nazis perhaps a little bit the greater exaggerators. Berlin communiques have come up with a number of lovely yarns. One plane, for example, was claimed to have shot down 19 R.A.F. craft on a single flight. This is more than willful lying on the part of the respective authorities. Plenty of times a youthful pilot will honestly believe he shot down the other fellow, when the other fellow was only playing 'possum to get away and dropped in a dive that seemed destined to end in a crash. Neither side any longer requires corroboratory witnesses of the successful combats. The pilot's word is considered enough. But he will unfortunately give himself the benefit of the doubt more often than not.

Reliable information on what targets Herman Goering's raiders have hit is obviously scarce, for the British generally admit only to losses of property and life among civilians. Here is, however, a partial list of targets struck by Nazi bombs up to the time this was written. It comes from confidential sources:

In London, the 20-mile-long array of docks on the Thames, starting at the city's east end and extending downstream, have been hit repeatedly. These are extremely important because half of Britain's imports pass through the port of London and Britain normally imports three-quarters of her food. Particularly damaged are the East and West India docks, around a famous horseshoe bend in the Thames. The land area between the arms of the horseshoe contains many warehouses and food storage plants, most of which have been levelled. Docks in Liverpool, Newcastle, Bristol, Glasgow and Southampton have all been severely damaged. Although Nazi bombardiers have not been so accurate as they were in France because they have met greater opposition, relatively little precision is required in attacking the docks: they are immense area targets.

Among aircraft plants hit are the Vickers works at Southampton, where *Spitfires* are made; Vickers at Weybridge, home of *Wellington* bombers; the Hawker (*Hurricane*) works at Kingston-on-Thames, right outside London; the Rootes "shadow factory," where *Blenheims* are being turned out, near Liverpool; the Bristol plane and engine works, just outside Bristol; the Armstrong-Whitworth works (*Whitley* bombers) at Coventry; the Rolls Royce en-

(*Continued on page* 54)

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gine plant at Derby; the Short Brothers factory (four-motored flying boats and a new four-motored bomber, the *Stirling*) at Rochester, also near London; and Handley-Page, just outside the capital. So far as could be learned, however, none of these is even close to being out of production.

Woolwich Arsenal, the government-owned munitions factory and the largest in Great Britain, located on the Thames downstream from London, has been badly damaged. So also have several gas works and power stations in the world's largest city. To all this is to be added the destruction of the normal routine of the city, the destruction of sewers, electric conduits, water mains and so forth.

None of this has meant so far, however, that Great Britain is crippled—for which England has the R.A.F. to thank. The British war effort is relatively unimpaired. A swarm of air raid workers, police and soldiers has been able to make emergency repairs to London's essential services faster than the Germans have destroyed them. On the other hand, the Nazi attacks have meant the diversion of people, supplies and energy on a gigantic scale to rescue, shelter and repair work. This is a factor of some importance, since all might otherwise be devoted to the direct war effort.

During the first two weeks of intensive air war the German attacks were directed principally against towns and military objectives, including airports, in southeastern England. The attacks on London were not begun until most R.A.F. stations in the area had been made untenable. Thus the Nazis cleared the way to London. In the course of their operations up to the end of September, the repair facilities and hangars at 29 airdromes, principally in southeastern England and around London, had been put out of commission or damaged.

You could watch this development merely by reading newspaper dispatches carefully. At the start of the Battle of Britain, British fighters made contact with the enemy out over the English Channel. Then, for a while, contact was made over the coast and the Thames Estuary. Now it is more often made close to the outskirts of London —and many a plane has fallen in the streets of the capital itself. At present, the R.A.F. squadrons called on to defend London have to operate principally from fields north and west of London and far enough away so that the fighters haven't much gas left by the time they arrive at the scene of the battle. Nazi single-seaters which must also, of course, travel a long way, solve their range problem by operating in relays with the same flight of bombers. The Germans have enough planes to spare for such an arrangement; the British do not.

In connection with the German effort to tire out the R.A.F., a primary German objective has been to draw out the English reserves, particularly of pilots. Realizing their need for fresh pilots to carry the load if an invasion were attempted, the British had set aside some 2,000 pilots, who were either kept on the ground altogether or stationed near cities which were not subject to frequent attack. One of the purposes of shifting the attack to London was the belief that it would force the R.A.F. command to throw its reserves into the fray, where other attacks would not.

The British resisted calling on its pilot spares as long as possible, but were finally compelled to send some of them into the London battle. Do you remember the few days between September 10 and 14, when London seemed defended only by an incredibly heavy anti-aircraft barrage (half a million shells a night)? It was at that time that the British began moving men in from outlying districts to rest the wearied defenders of the capital.

In sum, it must be stated that the Germans have done an enormous amount of damage. Yet, on no single day have more than 1,000 *Luftwaffe* planes been sent across the channel and the North Sea—less than one-fifth the effective strength of the Nazi air force. It is difficult to imagine the horror that would follow if the rest of the German planes showed up. Precisely why no more have been sent remains a mystery. One explanation is that the Germans thought that the thousand a day would be enough to soften the R.A.F. up for invasion or whatever else Berlin had in mind. The rest were being kept in reserve for the final stages. When it became apparent that the thousand were too few, it may have been figured that the risk involved in committing the rest of the *Luftwaffe* was too great, that it would be better to continue the siege of London on the present scale and deliver the main blow somewhere else.

Though there have been times when the Royal Air Force bent and when London's people seemed shaken, so far, neither has broken. Not the least factor in the English air force's stubborn resistance may have been one mistake it is known the Germans made. They grossly underestimated British aircraft production during the last few months. But they were not the only ones surprised when figures for July and August finally leaked out a month ago. For British manufacturers, spurred by the determined Churchill cabinet, had succeeded in turning out 2,500 planes in each of those months—of which fully 40 per cent were fighters. That's just about double the production rate Britain had been expected to be able to reach. It has been a big help.

END

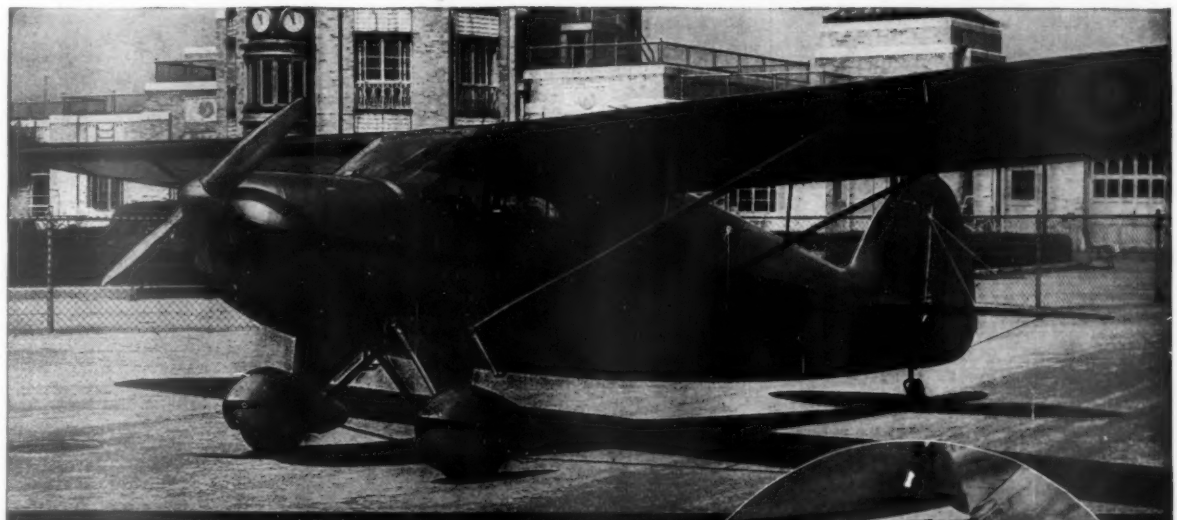
Man Overboard!

FLYING CADET R. C. HARRIS of the Army Air Corps primary training detachment at Glendale, Cal., recently went for a check flight with Lieut. R. L. Scott. Harris accidentally dislodged the catch on his safety belt and in the midst of a snap roll found himself in midair without an airplane. He pulled his rip cord, tucked it away in his pocket and landed in a soft, plowed field. Harris thumbed a ride to San Fernando and astounded Capt. K. P. McNaughton, commanding officer, with his report: "Sir, this is Cadet Harris. I just fell out of an airplane."

Dutch Plans

SURVEY flights across the South Atlantic ocean with American-built Douglas DC-3's were scheduled to be started this spring by K.L.M., the Dutch airline. Following the surveys, mail and express only were to be carried in the DC-3's. Eventually, four-engined Douglas DC-4's were to be used on the route and will carry passengers.

THE NEW *Funk* MODEL L



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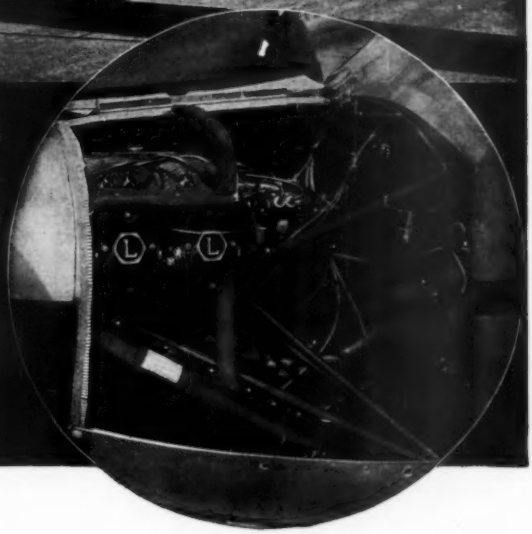

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Can You Fly?

(*Continued from page 31*)

you remember, from day to day, the things your instructor tells you; how to close the throttle, how to look for planes prior to take-off, to look at the wind sock before coming in for a landing? How well will you retain instruction, directions, warnings and the multitude of little things that distinguish a good, safe pilot from a poor one?

Students who excel in the next tests are also likely to become good pilots. It is the *inductive reasoning* test, measuring one's ability to reason from a part to the whole. The test shown here may not be the final word in regard to your ability to reason, but take a chance:

Example: 890123
456789
012345
678901

Here is a *continuous* series of numbers. To get the next number, merely add "1." 8+1=9, 9+1=10 and so on, *from the first "8" to the last "1."*

In this one:

680–46
8024–8
0–468–
–468–2

You add "2" and obtain the next number: 6+2=8+2=10, and the blank space after "0" would be filled with a "2" as the next number would be "12."

But now here are a few of varied difficulty. Only a few problems in the actual test are as hard as No. 3. If in doubt, check your answer with the one given at the end of this article:

1	*2*	*3*
135–91	0369–	9–7–5
–5791–	—1—	–3—
–791—	—6—	—1–
7——7	—4–	——5

Your ability to use inductive reasoning is an indication of how you may use your head in a plane, how you will decide to land when someone taxis across your path, what direction you will land when the long runway is directly cross-wind and it is a problem to decide what to do!

Of course, the same might be said of tentative reasoning, which is the last of the Primary Abilities tests. The psychologists claim that a good pilot can reason the effect of one action in regard to the ultimate result. For instance, try this on yourself:

Example (see Figure 1): If No. 1 gear turns in the direction indicated, which way does No. 4 turn?

Not all the problems are as easy as this one. A harder one is the problem of pulleys, or levers, or spiral gears. The psychologists claim that your natural inclinations would have stimulated your interest ing such things long before you matured, thereby enabling you to answer the questions. Whatever the reason, it has been found that those who score high in tentative reasoning tests are able to demonstrate creditable headwork in the air.

The tests are in the very beginning of their existence, but results are encouraging. Psychologists in many universities are attempting to find other tests that will pick a pilot every time. One test that achieved astounding results was conducted with an apparatus so constructed that it measures brain waves. Small electrodes placed on the skull pick up electrical waves from the brain, waves that usually form a definite pattern and wavelength. In some persons there is a variation of this wave that indicates abnormality. For instance, a certain pilot, while sleeping in a large barracks, was observed to twitch violently during his sleep. It was later determined by the brain-wave method that his pattern was that of an epileptic. He later admitted his shortcoming, claiming that he thought little about it because he was afflicted only at night!

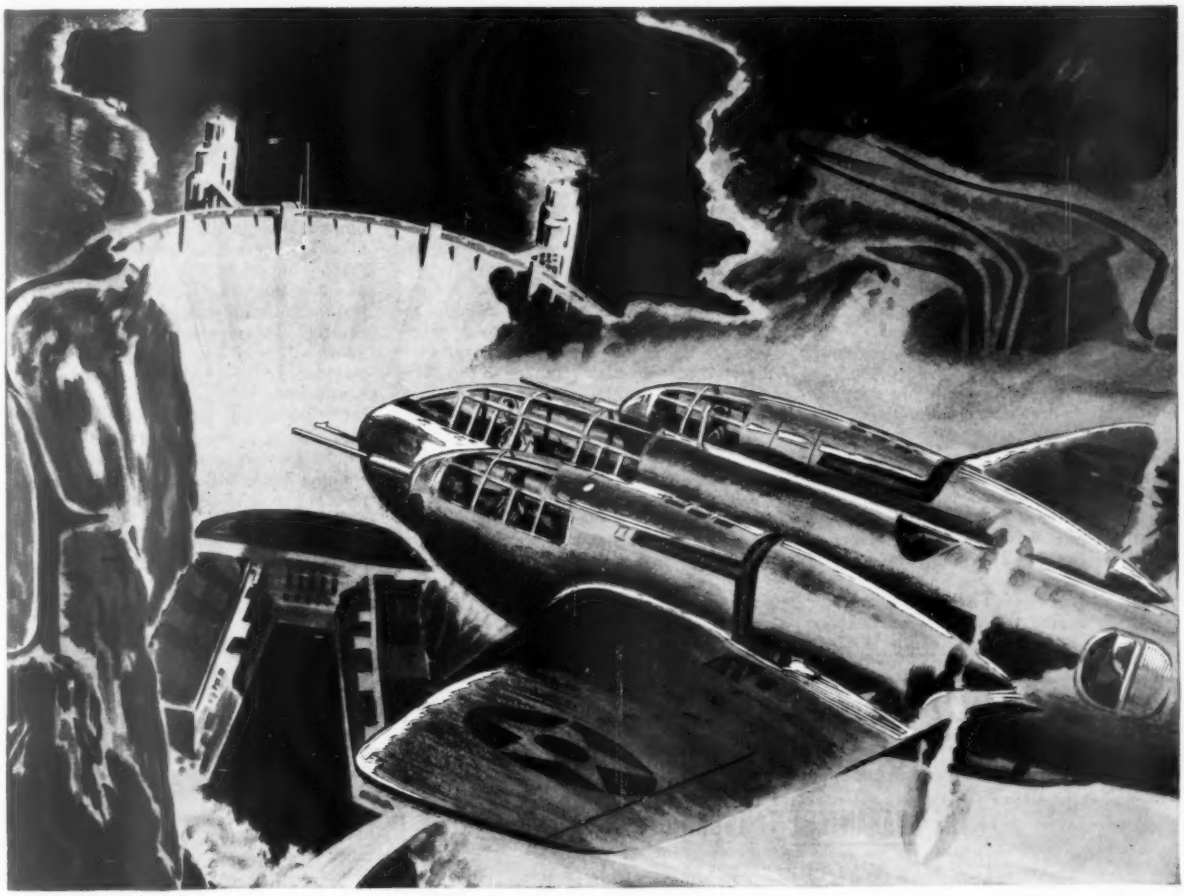
Everyone has heard of the famous tests given to military pilots, especially the heart test. This is made with the aid of a sphygmomanometer, or blood-pressure indicator, and the results are called the Schneider Index. Of course one must have a heart capable of withstanding the strain of military flying, but actual figures prove that the best pilots do not have high Schneiders! In other words, the super-man with the iron heart is very often an inferior pilot!

The test of physical perfection that *does* indicate your pilot ability is the depth perception test. Would you care to test your own depth perception? It may be done quite simply by having a friend arrange a pile of books on a table, behind which he may hold two black, identical pencils in a vertical position. The books act as a shield to screen his hands, one of which is held stationary six inches behind the books and low enough so that you see only the pencil. Now, standing 20 feet away, you direct your friend to move the other pencil toward or away from you until the two pencils are abreast of each other. To be really good, you should get them within one-half an inch of one another.

There is a high degree of correlation between good pilots and pilots scoring high in depth perception. If you are landing an airplane, do you know where the ground is? How far ahead of you is that tree; how far below your wing tip? How far is it to the end of the field—do you think you can clear the obstacle on the take-off? Where is that airplane you see near the airport: is it near or far and at what distance must you take measures to avoid it?

Still another test that may be conducted in the classroom is one called "anthropometric measures" (the science of measuring the human body). The measurements taken are the biacromial diameters, or the breadth of one's shoulders. Those having broad shoulders make the best pilots and those having relatively wider shoulders show a greater aptitude for flying than the rest. No logical reason has been advanced for this peculiar correlation and, of course, there are always exceptions to this rule as there are to all rules concerning humans.

There are many other tests, more than we have time to mention here, but one of the interesting kind is the maze test. In Figure 3, commence at the left side and follow through the little gates with your pencil. The maze is not easy—quite the contrary. Some students show a frustration complex, some blow up, tear the paper apart—a few cry. That is precisely what the psychologists want to know about you. So try the mazes and make them work—*it*



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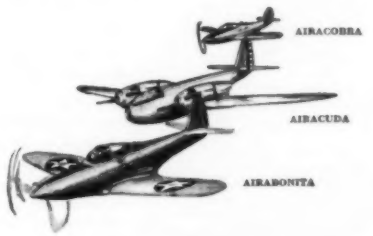

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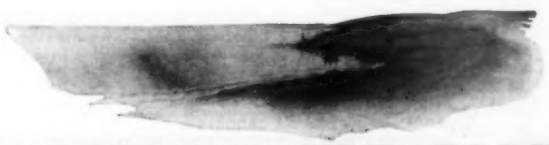

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can be done! If you finish one maze in less than five minutes you are a whiz, less than 10 minutes good, while 30 minutes would at least indicate high persistency.

Another very interesting and satisfactory test in which excellent correlation is indicated between good students and good pilots, is the test for ambidexterity. Can you use either hand well? Can you use the right hand on the stick, the left hand on the throttle and make your hands perform their appointed tasks? Most good flyers can, so try the test in Figure 3, first using your right hand and then your left, trying to place a pencil dot in the center of each circle. Dots that touch the circle do not count—the dots must be inside the circle. If you finish in 15 seconds for each hand alone and score 100 per cent you are ambidextrous. It seems that those who can use either hand with facility may become good pilots, perhaps because the brain centers involved are more or less equally developed.

After you have taken your first few lessons, there is still another test that shows great promise in determining whether or not you should go on with your flying. This analysis is of course up to the instructor, and therefore is subject to human error. Still, the results thus far have been very encouraging, and here are some sample questions:

1. Is the student tense or relaxed when he is flying?
   very relaxed normal
   slightly tense very tense
2. Does he become easily upset?
   very easily easily sometimes
   seldom
3. To what extent does he have the feel of the ship?
   very well fairly well average
   poorly

The instructor fills out the entire list and the scores are added. This results in a total score that gives the psychologists something to work on when or if the student is eliminated from flight training. But, they claim, a test is needed that will appraise the student for his strong points, a test that does not give merely an over-all rating. This is, at present, a tough problem that has the brain-men baffled.

More methods of testing one's ability are being devised. In the United States today many psychologists are wondering why they can't find out beforehand why one young person with apparently the same background will "wash out," while another will become an "ace." There must be some reason why one student will try to land his airplane in a ditch or on the power lines that bound every airport, while the next student will use his head and throttle to carry the plane safely into the field. Doubtless many of the tests are inadequate, doubtless they have not been tried on the thousands of students necessary to give positive, uncontradictory evidence, but the results point toward the eventual determination of student ability and prognostication of success or failure in his attempts to fly.

How important this may become in time of emergency when it will be necessary to train only those who are competent, is self evident. If we can select pilots whom we know will be able to fly, we will save time and money. There are those of course who might prove to be aces if they were given a little additional training and effort—but they will be in the minority. The few who would be accidentally eliminated from training because they failed the classroom tests are so small as to be insignificant.

Can you fly? It seems, from the present stage of investigation and the cautious replies of scientific investigators who always want to test the million-and-first applicant before reaching a decision, that there is a definite correlation between the tests thus far devised and the instructor's results. *If* you are good in the tests for visual-space, memory, induction, reasoning, and perception, you have an excellent chance to fly safely. *If* your depth perception, your biacromial measures, your ambidexterity and your neurotic urges are favorable, you should succeed in your flying. And *if* you can think of better tests by which to examine these factors, please let the psychologists know!

Answer to Problem 3: 93715
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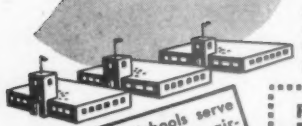

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The Dirigible Is Dead

(*Continued from page* 19)

there were seven cyclones in that particular state and I swear we must have ricocheted off all of them. If our ship had been a rigid, it would never have survived the first half hour. Twisting, turning, jolting over the hummocky air, we were tossed from one side of the atmosphere to the other, the great gas bag above us wrenched into fantastic shapes. Luckily it held together and we landed safely.

On another occasion, flying as the only Army entry in the National Balloon Races in Ohio, Lt. Herbert Couch—now a brilliant designer and a major to boot—and myself found our bag surrounded by darkness and in the midst of a summer thunderstorm. We were sailing along at 2,000 feet when suddenly a violent updraft yanked us skyward to 10,000 feet in less than four minutes. It seemed to me that we bounced off the bottom of a cumulus cloud, so viciously did we stop our ascent. Above the rattling of cordage and the peals of thunder, I shouted to Couch but before the words left my mouth, we had dropped again to 2,000 feet.

"I'm going to valve her!" I yelled. "Look for land and when you see it, hol-

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ler!" Crouch nodded and put the puny beam of a flashlight over the side. A livid flash of lightning illuminated his face. I saw his lips working. At last I heard him. "Trees!"

There was no time to lose. I ripped the balloon wide and we plummeted down. By the grace of God, we landed not 15 feet from a huge, jagged stump—over which the balloon bag draped itself. I can still raise a cold sweat in August by merely thinking about that escape.

Close shaves like those, however—and I have cracked up some seven times, once with the bag burning, once floating in the Missouri River, once on a thousand-foot cliff ledge—are not too common. No dirigible commander ever counts on them any more than does a balloonist. Storms remain the most dreaded foe in the catalogue of the lighter-than-airman.

As for motor failure this means little to a dirigible in calm weather. As the *Deutschland* once did while flying over the Mediterranean, the dirigible may ride lazily in the air while a broken engine is fixed, or the "rigid" may limp home with only one revving over. This fact gives people a false idea: that airplanes cannot be as safe as airships. Frankly, with technical developments as finely drawn as they are now, it is my opinion that the many motored transports are safer than dirigibles. A four-motored transport or bomber can make its destination under full load with only two engines functioning. A twin-motored plane can do the same with only one motor working. This opinion is shared by Pan American Airways, the most experienced company in the field. Next summer or before, they will put landplanes on their runs across both oceans. The shift is recognition of the fact that the company has unlimited faith in present-day motors. Incidentally, flying boats cannot survive a sea—any more than a dirigible. One case is on record where a Pan American flying boat sank within eight minutes after a forced landing in San Juan harbor, Puerto Rico.

Dirigible exponents have often pointed out the disappearance of Capt. Edward Musick over the Pacific in 1938 as an example of what fire might do to an airplane. According to the best available sources, the fire was caused by Musick lightening his gas tanks and the gasoline spraying back—ignited either by friction or a hot pipe. This defect has been corrected—all such possibilities of the future have been eliminated. What has not been eliminated is sabotage—which many people suspect caused his death.

Some of the less bold believers in lighter-than-air flight advocate the use of blimps—small-size, non-rigid dirigibles. They cite the phenomenal—so-called—success Britain had with them during the World Mar using them for convoys and in the present war as "balloon barrages." As for the first, unfortunately, any war we head into won't be the last one. As for the second, the "barrage" has enjoyed only a fair measure of success even in British-censored reports. German planes have picked them off like flycatchers nabbing gnats.

It is true the giant dirigible has not yet reached its full scientific growth. A metal skin has been proposed to add to strength and durability. Another development often considered would be the refinement of Diesel engines for air work. The present clumsy mooring methods as well might be substantially improved.

But these refinements would not remove the main objections to dirigibles—their bulk, vulnerability to weather and attack, huge expense and relatively short life—plus their tortoise speeds and super-trained experts. The United States had only one ship left until recently—the *Los Angeles*—which was kept partly dismantled and used for "training purposes." What training, God knows! The courses given lighter than airmen, as far as I know, ended with the *Macon* crackup five years ago.

When they start million-dollar appropriations to wheel the big cigars out on the flying line again, though, I'll be fighting against it with every ounce of influence I have. I've seen too many of my friends killed in senseless wrecks, too much money going up in flame and storm, more than enough of flying that can be done more ably, efficiently and cheaply by airplane.

Dirigibles formed my first training in the air and I'm sentimentally sorry to see them go. But this is a world where sentimentality is dangerous—where common sense must rule if the United States is to remain free and a world power. Here's my bunch of rue on the grave of the rigids. May they never rise to haunt our Air Corps again!

END

I Learned About . . .

(*Continued from page 42*)

in there now. And, as I started getting altitude, the rain was changing to snow—soft, wet, sticky stuff that was weighing the ship down. Sure, I knew my Arizona weather! It *never* could snow in August!

I started using my head. We drove into a windshift. I thought the crate was coming apart a couple of times. At the same time, I realized that in some unaccountable manner explained on the map but hidden from my too-wise, unseeing eyes, had been an indication that the storm was heading south. It had broken away from its normal east or southeastern, or even northeastern path and was doing something no self-respecting storm had ever done before, to my knowledge.

I had 8,000. I wasn't loading snow too rapidly. The only way out, at this moment, was to run with the storm. So I turned south. I'll never know, but my guess is that during the next wild 30 minutes I went 60 miles into Mexico. Slowly I pulled away from the storm. I simply out-ran it, while Tucson and Douglas wondered what the devil had become of me. After a while I came out of it and started shopping around. I'd flown over enough of this section of Mexico to realize when I came onto a railroad running compass north that this was the Mexican National. If I followed it north, sooner or later I'd come to Douglas because that was where the line ended. A fine piece of navigation, but safe!

I dropped what altitude I had left. I got onto the railroad track and started back towards the United States flying just high enough to clear adobe huts, a telegraph line running along the railroad tracks and a few low trees. Both Rudd—who by this time

(*Continued on page 63*)

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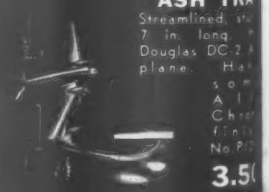

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(*Continued from page* 60)

was slightly anxious to have the flight done with—and I, who felt the same way about it, were not looking straight ahead. We couldn't see ahead. We were looking straight down out of the side windows, glad that we were able to see the ground, which was not much more than 50 feet below us.

We both were worried. We didn't know when we might bump into something which was 10 feet higher than we expected it to be. We knew that the entire airline by this time was in a state of suspense bordering on hysteria. We knew we had many thousands of dollars' worth of airplane with us, that we were responsible for it. And we thought about our necks.

As we flew northward, into the teeth of the storm, but underneath it, it continued to snow! It was slushy and wet and mixed with rain, so it didn't stick. It sluiced off the wings just about as fast as it formed. But you simply couldn't see out front. We must have gone over a town called Fronteras. I recalled pulling up the nose to get over a few adobe houses. We barged on north, with less and less ceiling.

"I think," I yelled at Rudd, "that maybe we'll make it."

He didn't look too happy. The ship was still rocking, pounding and creaking. The headwind slowed us down. The gasoline supply was getting lower all the time. Finally, after what seemed hours, I started to play engineer. Locomotive engineer. I'm glad, as I look back on it, that there was no train coming the other way. That would have been the first case of a head-on collision between an airplane and a locomotive, as far as I know.

We could see enough of the ground now and then to realize that it was white—covered with snow in the middle of August! Eventually we came to the border fence. Yes, I mean the fence that separates Mexico and the United States. I swung right from north to east and started down the fence. Luckily I'd flown over this country so much, both as a barnstormer and as an airline pilot, that I could even recognize a border fence. I flew the fence for a while, knowing that the Douglas field's south line was along the border. Eventually I spotted the boundary markers, kicked the rudder around until the ship was facing north, pulled back the throttles and felt the ground under me. The ground was covered with four inches of snow.

Immediately, I started to taxi up the field toward the waiting room. It was not until I was within 50 yards that the groundmen on the field realized that the ship was on the field! What you could see of the place looked like Minnesota in January. The gang came running out into the snow to meet us. I never saw such an unbelieving bunch. They couldn't realize that the airline equipment was intact and that so were Gustine and Rudd. They hadn't heard from us for an hour. They'd had no idea where we were. I felt pretty badly about the whole thing. I'd upset the line from one end to the other and had very nearly given aviation another very bad mark. Simply because I wouldn't believe a weather map when I saw it. Because I relied on my own judgment, that of a catch-as-catch-can amateur meteorologist, when I had available millions of dollars' worth of facilities, brains and experience to help me if I'd only had enough sense to use them!

I flew the airline for two more years. I never had another close call. In the hundreds upon hundreds of hours that I flew, I didn't hit a bad storm. Simply because, from that time on, I realized that weather maps couldn't be more valuable if they'd been printed on thousand dollar bills and Government bonds.

In my time I've met a lot of guys who could "smell a storm coming." Some must have had a cold at one time or another because they came to grief. But I've never yet heard of a fellow having a serious accident either while studying a weather map or after studying it. Maybe you don't fly an airliner. Maybe you just fly a 40 h.p. light plane. But, whatever you fly, take a look at the weather map if you are going cross-country.

END

Army Photos

PHOTOGRAPHY is playing a more important role in the Army Air Corps daily—at Randolph Field, at least. The photo section at the Army training center produced 27,798 contact prints and enlargements during two recent months. Included in this total were six 40x48-inch photo murals and 233 lantern slides. The Randolph Field photo section contains 11 men.

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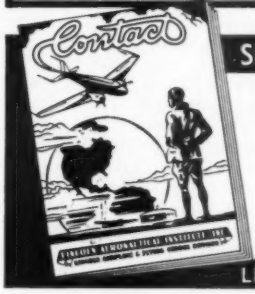

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You Don't Say!

(*Continued from page* 40)

ited, but we were to follow a friend, John Badger, and as long as good old John would be in front of us all the time, we felt that everything would be lovely. Well, it *was* until we left Louisville, Ky., whereupon we lost our guiding pilot in the haze. Believe us when we say that, from that very, very lonesome moment until we onepointed on the Ft. Lauderdale (Fla.) airport, our lives will never again live over a more exciting period. "We learned about flying from that." We would not recommend that other 60-hour pilots with little or no cross-country experience try the same stunt. With less luck, it could have been tragic if our engine had stopped while over a few spots—over which we'll never again be caught in an airplane. . . .

We are flying to Florida again and, with your flight calculator plus about 100 more hours, we believe the trip will be less exciting. . . .

MR. AND MRS. E. W. PERRY.

Euclid, O.

● Not that it will make the Perrys feel any better, but the first FLYING AND POPULAR AVIATION flight calculators were in the hands of pilots in February, 1938, more than 2½ years ago. Incidentally, Mr. and Mrs. Perry won the National Amateur Contract Bridge Pair Championship at Cleveland in 1938.—Ed.

"No Vacancies"

Sirs:

I should like to call your attention to a cancerous condition which has been allowed to grow in the armed forces of this country. . . . At the present time, when the Army has great need of recruits, Negro applicants are turned down. "No vacancies" is the reply. The Navy continues its policy of enlisting Negroes into the messmen's branch only, thus relegating them to an inferior position. Recently, I filed an application through the 369th Infantry, New York National Guard, for admission to the Army Air Corps as a flying cadet. I received this reply:

"Reference the attached application for appointment as flying cadet, the following is quoted for your information.

"'Application and allied papers for flying cadet appointment of Second Lieutenant Thomas D. Davis, 369th Infantry, New York National Guard, are returned herewith. As there are no air units composed of colored men in accord with War Department policy on this matter, no provision has been made for their training. If this training is made available, Lieutenant Davis may resubmit his application.'"

Thus Lieutenant Davis, like myself and other unfortunates, must wait until such provisions are made. But how will such provisions ever be made if Negro applicants are turned down one by one? As an American citizen I denounce this policy of the War Department, because it deprives me of an opportunity to serve my country in a manner of my own choosing. As a member of the National Guard, I denounce this policy as detrimental and incompatible with proper building of the defenses of this country. As a human being, I denounce this policy because it hurts a man to know that, no matter how hard he tries or how suitably he may qualify, he cannot go any higher. I ask your aid in bringing this matter to the American people so that they may know how well democracy is flourishing here. Should I be able to strike a blow at these forces of intolerance and racial prejudice, I will consider my duty as a citizen to be well done.

FITZROY NEWSUM.

Brooklyn, N. Y.

● Almost simultaneous with the arrival of Reader Newsum's letter came word from Washington that President Roosevelt had approved a system developed by the Army General Staff which provides for Negro units to be formed in many branches of the Army, aviation included. According to the Washington report, Negro aviation units will be formed "as soon as the necessary personnel has been trained."

END

AOPA News

(*Continued from page* 46)

Within the next few days over 50 airports in the United States are to be "acquired" by military or tactical units. We are told non-scheduled operations will be "inconvenienced until they can find other suitable areas to operate from."

You can't fight this battle alone! As a group, we command great respect and we'll get proper representation, but the day of the "lone wolf" is a chapter in past history.

Let's take the airline pilots for instance, a small category compared with our group. They saw the value of associating together in an orderly fashion and because they have *one* organization representing their interests, they consistently come out on the top of the heap.

AOPA Wing Insignia

In answer to various questions regarding the use of AOPA wing insignia we wish to clarify the situation as follows. *ONLY AOPA members are issued or allowed to wear the AOPA emblem.* We will actively pursue any misuse of this emblem. *The AOPA wing is the trade-mark of a licensed pilot* and we desire to always have this insignia identify the wearer as a fully qualified pilot or aircraft owner. The tabs, showing a Roman numeral, were recently adopted by AOPA (and which are sent out automatically on the occasion of registration renewals as well as all new members) are a further method of indicating the pilot status of the wearer. Roman numeral VII, for instance, indicates that the wearer has soloed an aircraft during seven different years. Aircraft owners registered with the AOPA are entitled to wear the pin but not the tab unless they have qualified as a pilot per the above.

The AOPA membership card is nontransferrable. This year we purposely added, in addition to the registration number, the address and license number of the pilot as a further means of identification. As more services are added to the list of AOPA pilots privileges, the membership card will take on an even added significance. Pilots should not let others use their cards and *should report loss of card to the AOPA immediately.*

END

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Once again military science strikes a balance between attack and defense! For the first time in our military history, commanders saw as well as heard the reports of scattered scouts during the recent U. S. Army maneuvers! Read all about the startling results of this first military television demonstration; how such visual means of communication can play an important role in the defense of our nation! By all means, don't miss this timely, up-to-the-minute article . . . one of the many great features on radio you'll thoroughly enjoy in the

DECEMBER ISSUE

RADIO NEWS

NOW ON SALE At All Newsstands

Air Camping Is Sport!

(*Continued from page* 16)

half of the west, overnight stops should never be made far away from human habitation unless the ship is fitted with cactus-proof tires or complete equipment for tire repairs is carried. Otherwise you will find a tire flat with cactus puncture one morning and will have a long, hot walk before you can fly again. Anyone who gets away from the main airline stops in that part of the country is practically certain to pick up cactus barbs, though they may take effect days later. In any case it will save much work if you squeeze a tube of anti-leak preparation into your inner tubes.

Good camping opportunities will be found at the Federal auxiliary fields. They are invariably large, easy of approach and smooth. By their very nature, they are often in out-of-the-way locations, especially in the Alleghanies and Rockies. Needless to say, you stake down well outside the boundary lights. Needless to say, you build no fires. If you stake down near the beacon tower the alternating green and light flashes of light, the groanings of the rotating mechanism and the squeaks of the wind sock as it swings on its hinges all make a weird scene that at first may keep you awake. In many nights spent on such fields I personally have come to like it.

Some of these fields are not manned, but simply in charge of a caretaker; others have a communications station. In the more thickly settled parts of the country, the station crew live in nearby towns and come to the field only for their regular watches. In these localities visiting ships drop in frequently. On such fields, your contacts with the field crew should be slight. They are always courteous and helpful, but almost every minute of their watch hours is taken up with some specific duty—and the less you bother them the more welcome you'll be.

It is different on some fields in the Rockies where the whole crew lives at the field for weeks at a stretch, often dozens of miles from human companionship. On such fields no visiting ship will drop in for weeks, so you will be most welcome—to the point where you can't camp at all but must share meals and quarters. A day or a night spent at one of those stations, watching the amount of organization, skill and devotion to duty that goes into the operation of our Federal airways, will prove impressive to the amateur flyer.

The most interesting camping can be had on the mountain fields of the West, especially the northern half. But you must watch your step. Most of these fields are mere landing strips, some cleared by the U. S. Forest Service for fire fighting by air, some maintained by mining or cattle interests. Most are not on the aeronautical maps, for they are not fit for all ships nor pilots. They are high: up to 6,000 feet in Idaho and Montana, up to 9,000 feet in the Sierra Nevadas. They are tough. Often the approach is through a deep canyon and usually there is only one approach. If you overshoot, you go into the mountain. They are rough and short and have no supplies, no hangars and, sometimes, no windsock. Some are near a ranger station, others are a day's walk from the nearest ranch. Local commercial operators fly amazing loads into those fields, including fire fighting troops and mining machinery. For the private flyer the only reasonable ship seems a light plane — slow, so that it can be twisted around in those narrow approaches, and very lightly loaded so that it can climb steeply.

So far, few pilots seem to have tried those fields. Their use by non-commercial flights is fairly unregulated. In Forest Service matters, rulings are frequently made by local officials according to local circumstance, rather than by Washington. Many of these fields are in national forest or in primitive areas, regions kept purposely difficult of access so as to cut down forest fires and conserve wildlife. Free, effortless access for one group of citizens would nullify that and would be unfair. To strict conservationists, a pilot's access to those fields may seem unduly effortless. They do not see the difficulties involved nor the mental hazards, and only see a week's pack trip accomplished by sitting on an upholstered seat for a couple of hours. Unfortunately, local commercial operators have sometimes flown parties of pothunters into those areas, with distasteful results. The private flyer, flying his own ship, is in another class altogether and if he will not hunt or fish on those visits—and not build fires—he should usually meet no objections.

Camping on those fields certainly is worth the trouble. You may see elk in whole herds; you may meet old prospectors who haven't left those mountains in this century. To me, that is the main charm of air camping, more important than any consideration of money or time.

In ordinary air touring you look down all day on the grandiose, the almost incredible landscapes of America—only to spend your evening at a bar or at a movie you might have seen at home in some downtown district that looks exactly like every other downtown district from Portland, Ore., to Portland, Me. But in air camping you get those intimate views of the country that supplement the large views you have seen all day: a farmer plowing his field till the light fails; or a river boat, coming 'round the bend; or the evening talk of some cowhands at some corral gate; or the wild geese, hiking south.

. . . If you want to see your country the best possible way, try an aerial camping trip.

END

Smallest Pilot?

A BOSTON, MASS., midget recently bought a lightplane and presented the manufacturer's sales department with a problem. The purchaser is Bobby Draper and he weighs 80 pounds. Because he is only 3½ feet tall, it was necessary to build an extension onto the stick of his *Cub*. He uses several cushions on the plane's seat; he recently passed his private pilot's test, but only after a special parachute was obtained which he could wear.

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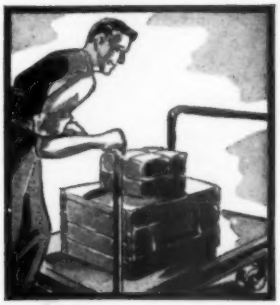

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Canada Supplies the Pilots

(*Continued from page 22*)

flying boats and Consolidated PBY flying boats are available at the various schools.

The private schools have to supply their own instructors and ground crews. The instructors have been picked from every phase of civilian aviation and many United States pilots are today instructing Canadian warbirds in elementary flying. Similarly the Royal Canadian Air Force has taken in numbers of United States pilots for instruction in advanced flying and instrument flying. In all it has officially been stated that a ground force of 40,000 is necessary when the British Empire Air Training Plan gets into full operation early in 1941.

Under the plan, pilots are given 200 hours of flying time before joining an active service unit. In the last war, in which Canadian pilots distinguished themselves, pilots went into action after only 20 hours of training. Of the 200 hours now necessary, the first 50 hours are put in at the elementary flying school during the seven-week period there. After 20 hours, instructors put recruits through a test of flight maneuvers including a 100-mile, solo, cross-country flight. That test determines whether or not the recruit will continue his course to become a pilot.

On completing their courses pilots, air gunners and observers all have a course at one of the 10 bombing and gunnery schools. This includes not only ground practice but also actual bombing and gunnery from the air. First work is done on the ground with a number of ingenious machines. One of these is the bombing teacher, a platform in a darkened room on which the bomb aimer perches so that he is looking down a shaft. At the bottom of this shaft a moving picture of a stretch of country is projected, so that it appears to the trainee as if he were up in an airplane looking down on country to be bombed. He gets used to operation of his bomb sight by spotting it on this moving panorama below him. Somewhat similarly for gunnery practice he uses a light-gun in a darkened room to hit a beam of moving light on the walls of the room which is made in the form of a turret.

From this ground work he progresses to target practice outdoors on small ranges using regular equipment on scale model moving airplanes. Then he is taken up in the air to use dummy bombs, smoke bombs and a camera for his bombing. Gunners after much preliminary work with camera guns are taken aloft to try their skill on towed targets made up to represent airplanes, their accuracy being gauged by the number of bullets put through the cockpit of the target. Ground instruction for both gunners and bombers includes technical training on wind speed and direction, and the mechanical make-up of his guns and bomb releasing machinery. Air gunners, who also are wireless operators, get a thorough schooling in radio.

While actual operation of the British Empire Air Training Plan is in Canadian hands, there is a joint committee in Canada representing the air forces of Great Britain, Australia, New Zealand and Canada which supervises the Canadian operations. Trainees from outside Canada will receive their advanced training only in Canada and, during this summer, the first batches started coming to Canada from Great Britain and the sister Dominions.

Financially all four partners of the scheme share in the expenses which at the time of the announcement were calculated at over $600,000,000, with Canada taking $350,000,000 of the cost as well as supplying most of the man-power. While the British Empire Air Training Plan has been put into operation, the Royal Canadian Air Force has continued its training schedules

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planned before the outbreak of war. Auxiliary air squadrons, organized on a non-permanent basis, were immediately called into active service. With these and other members of the Royal Canadian Air Force, the Dominion has already sent a number of squadrons fully equipped for active service to Great Britain. Even pilots trained as instructors have been sent overseas as need for their service in the fighting line was required.

Said Mr. Duncan in June: "Every effort is being directed towards the maximum output of pilots, air gunners and air observers in the shortest possible time for overseas service and a steady flow of pilots and subsequently of aircrews generally will proceed overseas monthly from now onwards to join the operational squadrons of the Royal Air Force."

END

Want a Job?

(*Continued from page* 44)

be no barrier to his finding reasonably well paid and not too exhausting work in the aircraft industry.

* * *

A general hint to job hunters. When you go in for interview, try to tell the personnel man who talks to you just as much about what you've done as you can. At the risk of being tiresome, we're going to repeat ourselves. It is a sad fact that fully nine-tenths of applicants for employment waste the most important minutes of their contact talking about things in which their interviewers aren't interested. These employment managers are anxious to find a place for you. If they weren't they wouldn't have seen you in the first place. They are, however, interested in finding out *just what you can do.* They don't want to know who your ancestors were or where you went to school—except incidentally—and they are definitely not interested in hearing the words that nine-tenths of all applicants say to them: "I've simply *got* to get a job!" Instead, they want you to tell them everything that you can remember about what you know or what you have done. If you have a woodshop in your garage and can operate two or three types of wood-working machinery, they'll be glad to hear about it. If you were a mathematical whiz in school they'll want to know that, too. Likewise, they'll be glad to hear that you have had two years of typing in high school, or that you can run an adding machine. Quietly and tactfully telling him what you can do and what you have done—even if it seems to have little application to aviation—will do more to break down the barrier that exists between you and your interviewer than any other factor. Don't forget this! If you were a soda jerk and the cash register was your responsibility, tell them about it! It doesn't sound like it has much to do with aviation, but people with that experience can be used in many clerical and minor bookkeeping jobs.

* * *

There seems to be a good deal of misapprehension about just what the Civil Aeronautics Authority—or Civil Aeronautics Board, as it is now called—requires of its applicants for civilian pilot training.

They have a bulletin that you can get by writing the Civil Aeronautics Authority, Attention: Private Flying Development Division, Washington, D. C. It will give you a complete outline of what they want. And it's very possible—particularly if you have or have had a pilot's certificate of any kind—that you can work out some sort of a deal with them. Often, if you can qualify for one of their instructor's courses, you can go to work for them later at good wages. Lots of men with commercial ratings haven't flying jobs, now. For these, the CAB program is worth investigating.

* * *

Well, that's just about all we have room for. Let's hear from you! We can do a much better job if you ask us about the jobs you are interested in. Nothing elaborate is required. A post card or a letter to us, care of FLYING AND POPULAR AVIATION, will be enough. Believe it or not, we're anxious to help you!

END

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COL. A. D. TUTTLE, medical director of United Air Lines, believes married men make better airline pilots than single men. His theory is that the bachelors—among other things—pay too little attention to their diets and the correct amount of vitamins, proteins, carbohydrates and what have you are vitally important to the pilot. Pilots' wives "just naturally watch out for their husbands' diets," Colonel Tuttle points out.

Shelved DC-5

WITH work on a commercial airliner version of the new Douglas DC-5 delayed for an indefinite period, Douglas officials have been awarded an order for seven DC-5's by the U. S. Navy. Four of the Navy's ships will be built as cargo carriers, the other three as personnel transports.

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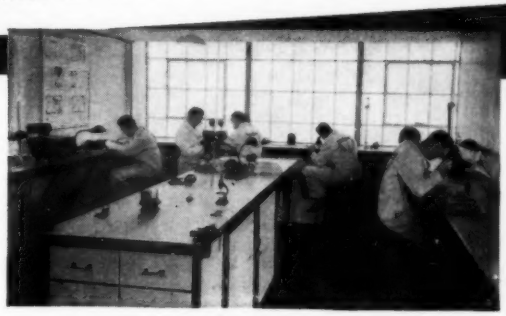

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Airy Chat

(*Continued from page 4*)

few regular monthly columns as possible. Mr. Barrett tells us that there are thousands of young men seeking employment in aviation today who are badly in need of advice. Several years of personnel work with some of the largest aircraft manufacturers in the country make Mr. Barrett the ideal man to handle our "advice-to-the-shop-lorn" department. So, though we once avoided letters on the subject of employment in aviation, we now look forward to as many as our readers can afford to mail.

* * *

IF, as you read "Can *You* Fly?" on page 30, you dig your finger nails into your hands and perspiration soaks your collar, you'll have a fair idea of what we went through as we edited John R. Hoyt's manuscript. Not that Mr. Hoyt doesn't write neat copy; what has us in a dither is the series of diabolic psychology tests that is supposed to give a man an inkling as to whether or not he'll make a good pilot. Anyway, the psychologists sold Mr. Hoyt on the idea. And if Mr. Hoyt, old-time flyer that he is, thinks the psychologists have hit on something worthwhile, well, we guess they have. But, at this writing, *we're* still lost in the outskirts of that maze on page 31.

* * *

WHAT'S-IN-THE-WIND DEPARTMENT. The following arrived from a correspondent the other day: "There is an unconfirmed report that Earl Ortman snagged a Nazi while in England, got decorated, a kiss on each cheek and a $600 bonus." All sorts of stories bouncing around these days concerning the reported ferrying of Lockheed *Hudsons* across the Atlantic to England. But reports are persistent that some American pilots have been making these flights periodically. Newest addition to the yarn is that they may be landing in Iceland (where part of the Canadian army is based) to refuel. Understand Richard Arlen, the movie actor, has established a flying school at Van Nuys, Cal. Robert Taylor's reported to have bought a new plane and is learning to fly it, with the help of Max Constant. And Wayne Morris went up for his private license not long ago. They tell us now that the Canadians are willing to take in American youths who want to fly and have had "a little" time in the air. An employe of the Glenn L. Martin company recently got a patent on a bombardment device that will automatically drop bombs at intervals spaced electrically according to the speed of the plane.

A U.S. Army flyer, on duty as an official observer in England, almost accompanied a regular *Spitfire* squadron on patrol, flying one of their planes, recently. But a British high-ranker got wind of it in time to stop the enthusiastic Yank. Latest War Department contracts for airplanes included one for $141,320,610.37 to Douglas and another for $99,641,880.83 to Martin. Two Pan American Airways navigators on the transatlantic run did such an accurate job of navigating their big clippers, one day last winter, that they suddenly discovered they were actually flying a collision course in the middle of the Atlantic. After checking with each other, they quickly changed altitude a few hundred feet and safely passed each other with a comfortable distance between.

The British have bought Howard Hughes' Lockheed "14" which he flew around the world and plan to use it in courier service between London and Egypt. Also, Richard Archbold's Consolidated PBY *(Guba)* has been sold to the British. Robert H. Hinckley, Assistant Secretary of Commerce, recently scorched Wayne Parrish, editor of American Aviation magazine, in a 17-page press release. Bone of contention was a caustic Parrish editorial entitled "Mr. Hinckley's Great Boondoggle." At closely-guarded and heavily-armed March Field a sentry recently took four shots at a man who didn't stop when ordered to. The Army has a couple of the latest German engines at Wright Field, courtesy of the British, for exhaustive tests. Among other things, they've found that the Germans are using 87 octane gasoline. After all the fuss in the papers about Al Williams' resigning from the Marines in a huff, he still is signing his daily newspaper column "Major" Al Williams. Consolidated's Model 31 is being shelved for the time being. Don't be surprised to see the Navy try some tricycle-geared aircraft aboard a carrier. Lockheed assemblymen are about the only Yanks doing that work in England today. They're helping with the assembling of Douglas bombers and Curtiss fighters, as well as *Hudsons*. Business is so good out at the Douglas factory that the company's profits for 1940 are expected to amount to about $7 per share of common stock, after deduction of excess profits tax. TWA's financial figures for the first nine months of 1940 probably will be written in red ink. The Army Air Corps probably will jack up its 7,000-pilots-this-year program to 12,000 pilots. They have a slightly different system of conditioning and training up their sleeves. Donald Douglas just has set up an oil company in Los Angeles for experimental work. It's a private enterprise.

* * *

AT the moment we're trying to think of a wild and witty title for the article on Edgar Bergen The Flyer that Ed Churchill sent in the other day. Inasmuch as Bergen and Splinter-Lips McCarthy will be on our first front cover for 1941 too, we'll have to have a pretty snappy title. Incidentally, wait'll you read some of the things Bergen has been doing in aviation for some 10 years. We were just about as amazed as a guy ever could get in a job like this.

* * *

WE were on a coast-to-coast radio program the other night. "Wings of Destiny," it was called. Being one of three judges in a slogan-writing contest, we had the rather novel experience of giving a breathless young fellow in Ohio a $1,600 airplane free. For this titanic effort we were to get a transcontinental plug over the air for good old F&PA (which isn't a railroad). But somebody forgot all about the three judges in the heat of the death-defying drama. With the result that we were officially dubbed "The Pause for Station Identification" after the slip had been discovered.

* * *

We're staging a comeback tomorrow night. M. K.

END

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"Rags to Riches" Airline

(*Continued from page 34*)

Inland's route, if it were drawn as a cattle brand, probably would be called the "Broken V." Running on a slanting line northwest from Cheyenne, the important towns of Casper, Sheridan, Billings and Lewistown are touched before the route terminates 610 miles away at Great Falls. Also starting from Cheyenne, another line, slanting northeast and angled to form almost a perfect V at the base, starts upward to duplicate the other line. But it breaks about midway at Rapid City and Spearfish and runs directly east to Huron. This route is 541 miles in length. Closer observation, especially by one traffic-wise, will quickly bring the suggestion of a giant funnel with an 800-mile mouth, a perfect design for a feeder system. It draws into its maw traffic from hundreds of miles around its spreading arms and drains them into the connecting routes—Northwest, Western Air Express, Mid-Continent, and United Air Lines.

The smaller lines also have kept pace with progress in the matter of equipment. Starting its career with the early Stinson, Inland later changed to Boeing *Monomails*. The company had the only two Monomails in existence at one time and received frequent offers of purchase from museums. It next changed to Lockheed *Orions*. Later installed and in service today are six Boeing 247-D's. This type was found to be excellent for an operation such as Inland's. Twin-engined planes, seating 10 passengers, they have many years of service left in them. The demand for them is such that Inland was able to sell one of them recently at a profit above the original purchase price. The company is contemplating the purchase of replacements for its present fleet, but no decision as to type has been made.

Future expansion of the airline is contemplated in an application for the extension of the route from Great Falls into Lethbridge, Canada, a distance of 163 miles. Such an extension would effect a vital connection with the transcontinental Trans-Canada Airways at Lethbridge. Also seeking this extension is Western Air Express. A Civil Aeronautics Board examiner has recommended that no action be taken on this route. All interested parties, however, are actively pursuing the matter and it is believed that the C.A.B. will shortly issue its final findings. The Lethbridge extension would be an important stepping stone in the projection of the only inland, north-south air route extending from the Gulf of Mexico to Alaska. Such a route could assume military strategic importance as it would avoid the fogs that are quite prevalent on the West Coast reaching up to Alaska.

Inland's part in creating a modern airline and its efforts in the Lethbridge extension once again illustrates what a vital part a feeder line route can play in the commercial development and natural defense of our country.

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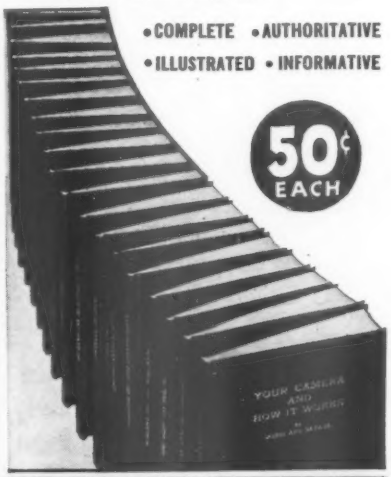

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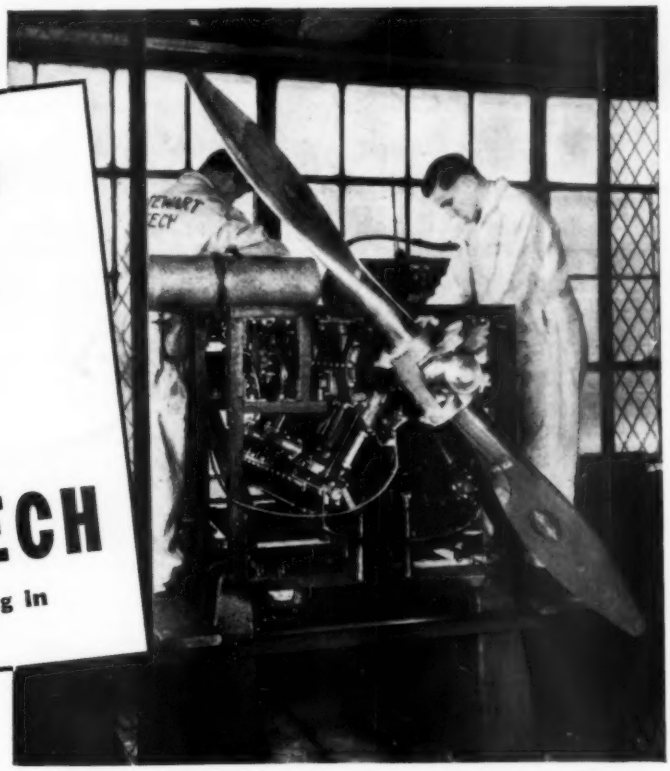

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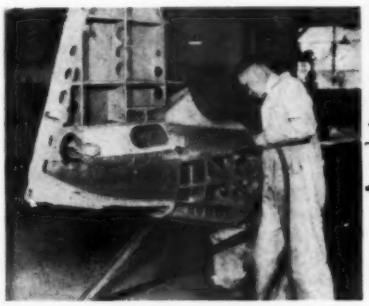

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Finance Your Flying

(*Continued from page 37*)

they'll want to know who is to be your instructor. That's all you do for the first step.

While you walk out of the office to boastfully tell your friends you are planning to get a new ship, the finance representative is doing two things:

1. He begins an inquiry into your real credit standing, using your references.

2. He calls on one of the big airplane insurance underwriting companies to be certain that full insurance on the proposed purchase can be written by one of them.

You probably know about a credit checkup. But you probably won't know just how the insurance company looks into your history. The underwriters want to know your license number and name—or that of your instructor. They want to know the type of ship to be purchased, the purposes for which it is to be used, whether it is to be hangared or staked out in the open and whether or not you have (or your pilot has) had any accidents in other aircraft or claims against other airplane underwriters.

All this stacks up to the fact that the underwriters want to know how good a risk you will be. As a matter of fact they have a small blacklist of pilots for whom they will not write insurance. Also they believe—and their own experience bears them out—that students are a pretty poor risk. Then there are a few pilots who are, as the companies put it, "on the ragged edge of being bad risks."

They're mostly willing, however, to give students a break and write the insurance without charging higher-than-usual rates. The few exceptions are generally those types of private owners who buy an airplane and announce that they're going to take just enough instruction to get to the solo stage; who say that they're going to be off on their own from there. They're poor risks too.

But let's say that all goes well and you and your instructor are approved for the loan. The insurance company agrees to underwrite the airplane for all risks. Then the finance corporation or your bank simply goes ahead and makes out the check that you pass along to the manufacturer from whom you are buying. The airplane is yours—with a few reservations. The reservations:

1. You sign a mortgage acknowledging that the finance company has a lien on your plane.

2. You sign a note agreeing to repay the finance company at a given monthly rate, which usually includes the insurance, interest and principal of the loan.

To make this illustration more concrete, let's suppose you decide to buy a $1,500 airplane. It's a new ship, so you are expected to put 33⅓ per cent on the line yourself. That's $500. Your finance company or your local bank—we'll have a little more to say about these banks in a minute—writes your check for the balance, $1,000.

Title to the new airplane, according to regulations of the Civil Aeronautics Board, is given to you. Your certificate of title that is kept with the ship, however, shows that the title is subject to lien. This lets the CAB know that you are not the only party interested in the ship. And under CAB rules, title to the plane cannot be transferred from you until the lien is satisfied. In non-legal language this means you've got to pay up before you sell.

Now comes the bad news. You've got to have insurance that not only covers you but also the insurance company for all risks: crash, fire, wind on the ground, theft, earthquake and what have you. That policy covers everything except mechanical

(*Continued on page 78*)

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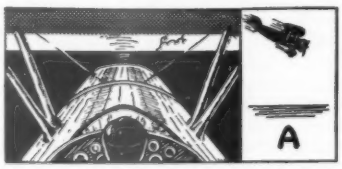
Here's the ABC of landing a plane, by ASSEN JORDANOFF

This sample lesson, from YOUR WINGS, shows how a book can teach you flying before you even get into an airplane.

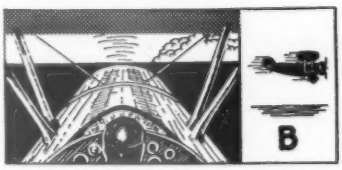
NOTE: *The type and illustrations below are ½ actual size of book.*

WE ARE flying at an altitude of about five hundred feet. I am going to show you how to LAND. Just follow me with your controls and look straight forward.

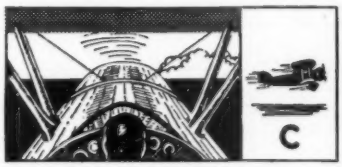
The illustrations show the position of the nose of the plane in relation to the horizon during the process of landing, and as seen from your cockpit. They also give the corresponding position of the plane as seen from the ground.



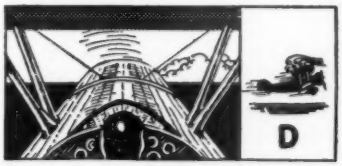
A . . . I am closing the throttle and simultaneously lowering the nose of the plane below the horizon, while gliding toward the landing field. As I approach the field, I constantly reduce the gliding angle, until . . .



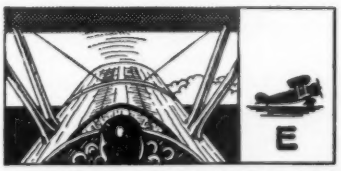
B . . . the plane is made to skim just above the ground, gradually losing speed . . .



C . . . before the plane actually comes in contact with the ground I am still pulling the stick back, thus continually reducing the forward speed . . .



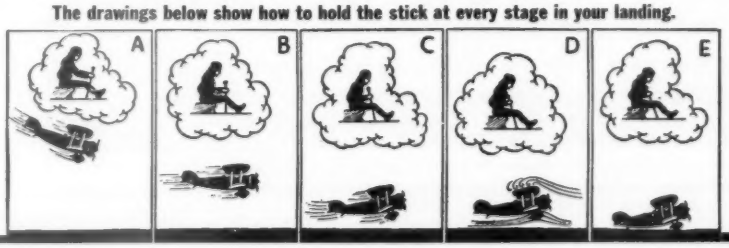
D . . . until the plane loses sufficient speed to reduce the lift below the weight of the plane, as the plane is about to touch the ground . . .



E . . . and lands on the wheels and the TAIL SKID at the same time. This is called a THREE-POINT LANDING.

The landing was just as easy as the take-off, wasn't it? And now, since you know how to land a plane, suppose we go up in the air and let you try it?

The drawings below show how to hold the stick at every stage in your landing.



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JANUARY ISSUE

FLYING AND POPULAR AVIATION

At All Newsstands December 10th!

(Continued from page 76)

or structural failure in the air. Insurance as full as this amounts roughly to 10 per cent of the full value of the airplane. In this instance 10 per cent of $1,500 would be $150.

Inasmuch as the finance company also is lending you this sum, they add this to the $1,000 loan, making a total of $1,150. On this they propose to charge you six per cent interest. Assuming that you wish to spread this amount over a period of 12 months, the interest will amount to $69, making a total of $1,219. Divide this by 12 and you have your monthly payment: $101.42.

It's not at all unusual, however, for the companies to write your loan on a 15, 18 or even a 20 month basis. In that case your payments are less. The 20 month payment would increase your interest charge to $126.50 This would make your total payment $1,276.50. Spread over 20 months it would cost you $63.82 a month.

Now suppose that you own the ship and that, on the second day you have had it, the wind destroys it while it is being wheeled into the hangar. Suppose also that the destruction is complete; it's a full washout. Your policy provides that the full value of the ship will be returned to you and to your co-owner—the finance company that holds the lien. Actually the insurance policy reads so that each of the interested parties gets a pro-rata share of the insurance payment. If you had paid down only one-third on the plane, you get one-third and the finance corporation two-thirds.

Suppose, however, that you had flown the ship for six months and meanwhile had paid off one more third of the original price. In that instance the insurance company would deduct a portion of the total value for depreciation and then would pay two-thirds of the value of the ship on the day of the accident to you and one-third to the finance company.

The interest rates cited here are not fixed and universally the same. In some cases airport operators who are well known in their home towns have been able to get the interest rates reduced from one to two per cent. The lowest the writer personally has known has been five per cent—but there have been stories that some local banks make these loans for as low as four per cent.

Thus far we've been talking only about light airplanes—mostly those used in the CAB pilot training program. But this same story applies to larger airplanes, some in the $20,000 class. A notable group is the advanced trainers of the CAB units. These planes are the Waco selling for $7,600 (in quantity) or the Meyers for $6,500. The financing of these planes has been done through the Reconstruction Finance Corporation or through local banks, for the most. The contracts on which these trainers were purchased were Government contracts and these looked good even to conservative bankers. The banks really scrambled around trying to crowd the finance corporations—who pioneered in the field of airplane financing—out of these contracts. Our sources indicate that they succeeded all too well.

Let's say a word about the finance corporations and the banks. The outfits that really did the spade work in aircraft finance are: Interstate Credit Corporation of Minneapolis; Aviation Credit Corporation of St. Louis; Aero Discount Corporation of New York City; National Discount Corporation of South Bend, Ind., and the Merchants' National Bank of Chicago.

This financing began in a small way nearly 10 years ago. The Minneapolis and St. Louis groups were among the first in the field and they have made large sums of money since their organization. Most of this, however, has been in recent years, with the CAB program, the new boom in private aviation, and the war being about equally responsible.

It used to be a joke around airports—where the boys are always short of funds—to tell an operator who was frantically wondering just how he'd get a new airplane to replace the ship that had been worn out by student work: "Go down to the bank and get the dough." It was a laugh, that one. The bankers used to kick pilots right out of their banks who were rash enough to try this. But not today. The banks, now that the airlines operated for a whole year without a single fatality and now that the Britons and Nazis are so busy trading bombs, have finally decided that aviation is solid stuff. So they're busy crowding in on the financing field. It's all to the good too. The banks are a real barometer, indicating better times ahead for all of us in the industry.

The insurance on these loans is written almost entirely by three large groups of

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aviation underwriters: Aero Insurance Underwriters, the United States Aviation Insurance group and Associated Aviation Underwriters. These companies are formed by larger companies that write—in all probability—fire, life, property, automobile and lots of other kinds of insurance. These groups are the aviation managers for the larger companies, handling the investigation and paper end of the business as aviation experts.

There are a lot of little quirks in the business. For instance, on purchases of second-hand airplanes the insurance companies demand what they call a "parts loading." This is an extra premium charged to take care of the replacements that might be necessary if the ship was damaged. It is a small percentage, usually, of the basic premium. The insurance men explain it this way:

"Suppose," they say, "a wing was knocked off by the new purchaser of this second-hand airplane. We wouldn't go out and buy a second-hand wing to put the ship back in flying condition. We'd buy a new wing. Yet the wing that was on the ship was a used wing and not worth as much as the new wing we're buying. So we charge a little more to make up for the difference in value of the parts."

The policy written with the loan never takes care of any structural failures or mechanical failures in airplanes. Suppose an insured ship was flying safely when the engine swallowed a valve. If the pilot puts the airplane down safely the damage to the engine must be borne by the owner not the insurance company. If the pilot doesn't put the ship down safely and it is wrecked in the landing, the insurance company will pay for the damage done in the landing—replacement of landing gear, wings, propeller, cowling, the carburetor knocked off in the descent, etc. But it would not pay for the damaged cylinder piston, etc., of the mechanical failure that precipitated the forced landing.

Most of the finance corporations and banks now are beginning to demand a "breach of warranty" rider in their insurance policies. This also costs a little more than a straight policy. The rider works this way: suppose a pilot went out and looped an airplane at 200 feet over a city and crashed. This would be considered a violation of the few fundamental flying provisions that must be complied with in accordance with policy terms. This violation is considered grounds for denial of the pilot's or owner's insurance claim. But with the rider, only the claim of the title holder is voided. The insurance company agrees to continue, even under these circumstances, to recognize the finance company or bank's claim.

These few provisions for flight rules that must be obeyed in the insured aircraft are merely fundamentals of good sense in flying. A look at a policy shows some of these actions that are considered sufficient grounds to void the payment of insurance are:

1. Flying while intoxicated.
2. Flying without a license.
3. Violations of licenses, such as a student pilot carrying passengers.
4. Acrobatics at low altitudes or over forbidden areas.

Recently, with the great increase in flying, the insurance companies have had a number of losses that came after pilots had gone hog-wild and attempted with light trainers to "shoot up" highways and drive automobiles off city streets. Then there were instances in which student pilots attempted acrobatics in formation at low altitudes, collided in the air and crashed. These instances of crazy flying have caused insurance rates for all pilots to go a little higher, due to the breach of warranty riders and other qualifying clauses inserted into insurance policies on financed planes.

None of the benefits of so-called "easy" buying can be obtained by minors. You must be at least 21 years old before you can finance a new plane. The reason, of course, is that you cannot sign a valid mortgage or note until you are of age. If you are 19 or 20 years old and prepared to run your own airport you'll have to get your parents or some good friend who is of age to take responsibility for purchase of your flying equipment.

Surprisingly enough the aircraft finance companies have wonderful records for payment of their loan contracts. Far less than one per cent of the loans are so bad that it is necessary to reclaim the airplanes themselves. This is a striking contrast to the automobile finance business in which relatively a large percentage of cars is reclaimed.

"It looks like most folks in the airplane business are inherently honest," one finance company executive told us.

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END

500 Miles and Faster

(*Continued from page* 47)

sound, or supersonic speeds, a lenticular section should prove advantageous.

Improved fins for air-cooled engines—that need lower airflow than used previously—and an extended crankshaft, permitted the design of fuselages with more pointed noses, as sketched in Section 5. Another improvement was the submerged radiator that required small entry openings, also shown in Section 5. Exhaust stacks were usually shortened to reduce resistance. Lately, however, it has been found that, by correct dimensioning and careful designing, the exhaust gas will add speed to the plane. A diagram in Section 6 and a sketch shows the gain obtained in speed and the design of this arrangement.

Results obtained by ballistics experts on resistance at supersonic speeds should be of great interest to the aviation student. Most economic body forms for 50 and 1,300 m.p.h. are shown in Section 7. It indicates that the faster the body travels the smaller the angle of the entering edge will be. Also it shows that the maximum thickness should be moved towards the rear. The diagram in Section 7 again shows the sudden increase of the drag coefficient at the speed of the sound. It also shows the drop after 900 m.p.h. In Section 8 the influence of the bullet on the distance it can be projected is illustrated.

The power required to pull a large tail wheel through the air at 400 m.p.h. is noted in Section 9. Another sketch shows that a vertical cut out of 25 per cent of the diameter of the fuselage increases the resistance by 130 per cent. In consequence, the best design is a perfectly streamlined fuselage.

Photographic takes shows the development of shock waves at supersonic speeds. A sketch in Section 10 shows the outline of the waves. More details are given in the sketch in Section 11. It outlines a region in which the speeds will exceed the velocity of the sound. It also shows the transition of the air from the body creating a turbulent wake. It seems that this transition is decisive of the critical speed the sudden increase in drag brings on. A table of critical speeds for various items is given in Section 12. The thickness and length ratio is noted with the item.

Velocity of sound in air is independent of the pressure and, in consequence, the altitude. It is, however, affected by the moisture contents of the air and its tempera-

(*Continued on page* 83)

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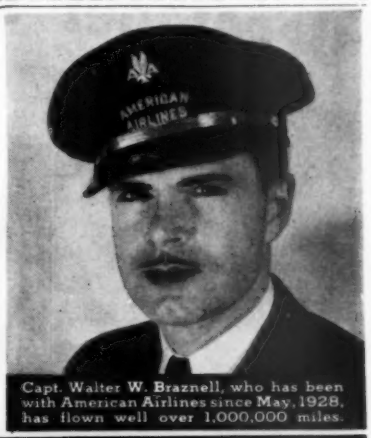

Capt. Walter W. Braznell, who has been with American Airlines since May, 1928, has flown well over 1,000,000 miles.

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(*Continued from page* 81)

ture. The velocity at 100° Fahrenheit is 1,160 ft. per sec. (790 m.p.h.), and at —10° 1,039 ft. per sec. (710 m.p.h.).

Drag coefficients of N.A.C.A. streamline sections at various speeds are shown in Section 13. The curves indicate that, the thinner the section, the higher the critical speed. The percentages given are the ratios of the maximum thicknesses and the chord of the airfoils.

These tests shows that thinner sections should be used towards the tip of the propeller in order to delay the critical speed. The tip speed of a nine-foot propeller at 2,460 r.p.m. will be 780 m.p.h. with the plane standing still. Advancing 500 m.p.h., the revolutions have to be reduced to 1,980 r.p.m. to maintain the 780 m.p.h. tip speed. This also indicates that a heavier section could be used in a wing than in a propeller blade design. The maximum efficiency of a propeller is about 93 per cent at 400 m.p.h. For higher speed the efficiency will be lower.

Another improvement toward higher speeds was the reduction of the engine weight per horsepower. It is close to one pound of water- and air-cooled engines.

Speeds limiting propeller and plane designs are plotted in a diagram shown in Section 14. It shows the possible revolutions for a certain diameter and the obtainable top speeds. Another interesting chart is depicted in Section 15, giving the altitudes at which the resistance will be a minimum for certain speeds. The drop from an altitude of 36,000 feet is due to the increase of the speed of the sound at lower altitudes. Scientists predict that with present day designs the top speed will be 630 m.p.h.

Supersonic speed test results indicate that a new method of propulsion must be used to overcome the sudden increase of resistance at the velocity of the sound. At supersonic speeds the propeller loses its efficiency very fast. Mathematics shows that a jet propulsion (rocket) has a higher efficiency past the 450 m.p.h. mark than the propeller drive. It may be that a new method will be found to break down the shockwaves far ahead of the oncoming plane. It is an open season for imaginative inventors.

END.

Pilots Wanted

YOUNG college men, between the ages of 20 and 26 inclusive, still are being sought by the Army Air Corps to train as flying cadets. In order that the qualified fledglings who receive wings at Kelly Field, Texas, may keep apace of the increased number of planes—bombers, pursuit, attack—rolling off the assembly lines of factories under appropriations for the Air Corps expansion, a greater number of pilots will be necessary.

New British Carrier

THE British Admiralty recently placed an order for a new aircraft carrier with a Clydebank shipbuilder. The new vessel will be similar to the *H. M. S. Implacable* but of greater beam and with more stowage room.

Overseas Mission

(*Continued from page* 25)

front, a squadron of French pilots in the American ships were mistaken by a squadron of British *Spitfire* pursuit planes for German raiders. The *Spitfires* promptly engaged the Martins in battle and, at the height of the fracas, a squadron of Messerschmitt Me-109's piled in. For a few minutes German, French and British planes were milling around, all throwing every bit of lead they could at each other. The French pilots finally pulled out and beat it for home, leaving the Messerschmitts and *Spitfires* to fight it out. Fortunately, none of the Martins was shot down in this otherwise humorous "battle of mistaken identity."

By the time the Martins were being rolled off the assembly line in quantity—four leaving for France every morning—Shannon and his colleagues heard on their shortwave radio news broadcasts from the United States which indicated that the French Republic was about to give in. On June 23 they and the other Americans in Casablanca boarded the United States destroyer *Herbert* and left French Morocco for Lisbon. Only a few ships were still at Casablanca and Shannon does not know what became of them. Whether any more were enroute and were rerouted to British ports, neither he nor any other Martin representatives will say, but his company previously had announced that the British government had taken over French contracts.

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Grounded Author

THE above photographs are supposed to be an object lesson to new-plane buyers; the "teacher" is none other than Leading F&PA Author Ed Churchill. He recently bought a lightplane—but it was delivered without an oil radiator (by mistake, of course). Churchill's comments, from top to bottom, are: "Aviator wonders if motor will overheat in California sky." "How in %$&# else can you cool the oil?" "Decides to %$&# with it anyway." "Sits down to wait for the radiator to arrive."

Flying Vacationist

ROBERT Wetherill, Jr., of Cleveland, takes his annual vacation trips by air. This year he flew a total of 9,894 miles on a 47-day trip which took him into Mexico and Central America. In his four years of aerial vacationing, he has now visited every commercial airport in the United States.

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Queen City Flyg. Serv., Cincinnati, Ohio.		Cont. 50	663 hr.		1050
H. G. Mayes, Huntington, W. Va.		Cont. 50	788 hr.	38 hr.	1050
United Aero Corp., San Antonio, Tex.	50	Frank. 50	700 hr.	500 hr.	1050
Rome Boekenhoff, Jr., 626 Maine, Quincy, Ill	Trainer	Frank. 60	80 hr.		1050
Cincinnati Aircraft, Cincinnati, Ohio.		Frank.	563 hr.		1025
Pierce Fly. Serv., 2135 Broadway, Eureka, Cal.	LC	LeBlond 85	250 hr.	just	1000
Hass-Hillyard, Mun. Arpt., Evansville, Ind.	C-50	Cont. 50	1100 hr.	950 hr.	1000
Hass-Hillyard, Mun. Arpt., Evansville, Ind.	C-50	Cont. 50	400 hr.	350 hr.	1000
Chas. Roberts, Mun. Arpt., Dothan, Ala.		Cont. 50	375 hr.		1000
O. E. Dickerhoof, Mun. Arpt., Chanute, Kan.		Frank.	457 hr.	400 hr.	1000
J. Jones, Munic. Arpt., Lancaster, Pa.	Low Wing	LeBlond 85	500 hr.	Eng.	1000
Virginia Air Serv., Gordonsville, Va.	Chief	Lyc. 50	700 hr.	May '40	985
Southern Airways Sales Co., Munic. Arpt., Birmingham, Ala.		Cont. 50	175 hr.	9/1/40	950
Baker-Eberle Aviation, Detroit, Mich.	K-45	Aero. 45	300 hr.	now	935
Hass-Hillyard, Mun. Arpt., Evansville, Ind.		Cont. 50	800 hr.	750 hr.	900
Portland Flyg. Serv., Portland, Me.		Menas. 50	425 hr.	none	875
Huron Flyg. Serv., Huron, So. Dakota.		Frank. 40	350 hr.		850
Florida Aero & Supply, Orlando, Fla.		Aero. 40	82 hr.		795
Ryan Air Service, Decorah, Ia.		Aero. 45	318 hr.		795
A. R. Smith, 113 E. Commerce, Aberdeen, Md.	K	Aero. E	850 hr.	30 hr.	775
Pierce Fly. Serv., 2135 Broadway, Eureka, Cal.	KC	Cont. 40	580 hr.	10 hr.	765
G. E. Verhostra, 2010 Hollywood, South Bend, Ind.	K	Aeron. 40	225 hr.	yes	750
Buroker-Hicks Flyg. Serv., Olympia, Wash.	K	Aero. 40	400 hr.		700
Huron Flyg. Serv., Huron, So. Dakota.		Aeronca	487 hr.	30 hr.	695
Mississippi Arwys., Jackson, Miss.		Aeronca	406 hr.	Nov. '39	675
Youngstown Arwys., Youngstown, Ohio.	K	Aero. 37	300 hr.		675
Lane Air Serv., Mun. Arpt., Albany, Ga.	K	Aero. 42	450 hr.	50 hr.	675
Tred Avon Fly. Serv., Inc., Easton, Md.	K	Aeron. 40	552 hr.	107 hr.	650
Hylan Flyg. Serv., Arpt., Rochester, N. Y.		Aero. 40	300 hr.	300 hr.	650
Jenkins Air Serv., Rochester, N. Y.		Aero. 40	400 hr.		650
Oakland Aircraft Corp., Alameda, Cal.	K	Aero. 40	730 hr.	Oct. '39	650
Pioneer Air Serv., Romulus, Mich.	K	Aero. 40	482 hr.	9 hr.	600
Daltz Fly. Corp., Roosevelt, Mineola, L. I.	K	Aeronca 37	539 hr.	74 hr.	600
W.Va. Air Serv., Box 401, Clarksburg, W.Va.	K	Aeron. 40	500 hr.	just	595
United Aero Corp., San Antonio, Tex.	C-3	Aero. 40	700 hr.	15 hr.	$575
East Coast Arwys., W. Hanover, Mass.	K	Aeronca 36	570 hr.	130 hr.	550
Perkiomen Valley Arpt., Collegeville, Pa.	K	Aeronca 40	200 hr.	no "	550
Schuylkill Arpt., Orweigsburg, Pa.	C 3	Aeronca 36	393 hr.	July '40	550
Morley Airplane Co., Madison, Wisc.		Aeronca	250 hr.		550
Pierce Fly.Serv.,2135 Broadway,Eureka,Cal.	C-3	Aeron. 36	1420 hr.	80 hr.	535
A. R. Currey, 452 Jefferson, Galesburg, Ill.	C-3	Aeron. 37	1000 hr.	recently	525
A. R. Smith, 113 E. Commerce, Aberdeen, Md.	C-3	Aero. E	750 hr.	Oct. '39	505
A. R. Currey, 452 Jefferson, Galesburg, Ill.	C-3	Aeron. 37		just	500
Jersey Flyg. Serv., Oakland, N. J.		Aero. 37	450 hr.	50 hr.	500
AMERICAN EAGLE					
A. R. Bonnin, 109 W. Dakota St., Sprg. Valley, Ill.	201	Kinner 100	665 hr.	Aug. '39	700
Valley Fly. Serv., Rt. 4, Bx. 132, Visalia, Cal.		Kinner 100	700 hr.	25 hr.	550
Lenhart Fly. Ser., Munic. Arpt., Marion, Ind.		Kinner K5	1090 hr.	just	550
ARISTOCRAT					
Red Bank Arpt., Inc., Red Bank, N. J.		Warner 125	348 hr.	35 hr.	675
ARROW SPORT					
Blvd. Arpt., Roosevelt Blvd., Philadelphia, Pa.	V-8	Arrow E2	100 hr.	no	800
Hobley-Maynard Air Ser. Arpt., N. O., La.	F	Ford 85	400 hr.	20 hr.	750
Hobley-Maynard Air Serv., Airport, New Orleans, La.	V-8	ArrowSport	350 hr.		700
Blvd. Arpt., Roosevelt Blvd., Philadelphia, Pa.	V-8	Arrow 82	430 hr.	90 hr.	550
BEECH					
H. A. Hammill, Box 922, Austin, Texas.		Wasp 450	500 hr.		8500
H. A. Hammill, Box 922, Austin, Texas.		Wright450	600 hr.	200 hr.	8000
H. A. Hammill, Box 922, Austin, Texas.		Jacobs330	700 hr.	200 hr.	7500
Red Bank Arpt., Red Bank, N. J.	B17R	Wright450	817 hr.	340 hr.	3795
BIRD					
Lenhart Fly. Ser., Mun. Arpt., Marion, Ind.		Kinner B5	610 hr.	600 hr.	1195
Jacksonville Air Serv., 29½ E. 2nd St., Jacksonville, Fla.	K-5	Kinner 100	260 hr.	July	1050
W.T. Anderson, Lincoln Arpt., Lincoln Park, N.J.	K-5	Kinner 100	200 hr.	20 hr.	1000
BOEING					
J. O. Dockery, Stuttgart, Ark.	Duster	Hornet 600	1296 hr.	1175 hr.	2500
BUHL					
Pekrul's Fly. Serv., Arpt., Traverse City, Mich.	Ca-6	Wright 330	950 hr.	50 hr.	2500
CESSNA					
R. G. Howard, Deposit Bank Bldg., DuBois, Pa.	37	Warner 145	450 hr.	405 hr.	3450
Strickland-Horner Air Serv., Arpt., Alva., Okla.	C34	Warner 145	682 hr.	none	2850
COMMANDAIRE					
Alliance Flyg. Ser., Alliance, Nebr.		Curtiss OX5	350 hr.	10 hr.	550
J. L. Schroeder, Rt. 3, Box 117, Houston, Tex.		Chall. 185	500 hr.	none	800
CONSOLIDATED					
J. L. Schroeder, Rt. 3, Box 117, Houston, Tex.	O-17	Wright 220	530 hr.	45 hr.	850
CULVER CADET					
Lane Aviation Corp. Arpt., Cleveland, Ohio.		Cont. 75	100 hr.		2200
CURTISS ROBIN					
Toomey, Gatleff & Webb, Knoxville, Tenn.		Wright 165	575 hr.	170 hr.	1400
A. R. Goldsmith, 61 Orchard, Manchester, N.H.	J65	Wright 175	700 hr.	150 hr.	1200
Leeward Aircraft, New Kensington, Pa.		Chall. 185	512 hr.	17 hr.	885
Geo. Roper, 27 S. State, Salt Lake City, U.		Challenger	800 hr.	Mar. '40	800
Regan Flyg. Serv., Shawnee, Okla.	J65		300 hr.	50 hr.	795
H.L.Peterson,W'mson-J'ns'n Arpt., Duluth, Mn.		Curtiss Chall.	442 hr.	190 hr.	750
A. A. Goldsmith, Nashua, N. H.		Wright J65	700 hr.	150 hr.	700
North West Jersey Air Serv., Clinton, N. J.		Chall. 185	550 hr.		675
A. Gillis Flyg. Serv., Great Falls, Mont.		Chall. 185	800 hr.	10 hr.	650
Aero Service, McKinley Arpt., Canton, O.		Chall. 185	800 hr.	70 hr.	650
United Aero Corp., San Antonio, Tex.		Chall. 185	650 hr.	350 hr.	600
R. A. Miller, North Benton, Ohio.		Chall. 185	444 hr.	380 hr.	550
CURTISS-WRIGHT					
McBoyle Cub Sales, Arpt., Lake Delton, Wisc.		Salmson 45		yes	500
DART					
Brayton Flg. Sv.,Lambert Arpt., Robertson, Mo.		Ken-Royce	250 hr.	200 hr.	2975
Ashcraft Bros. Flyg. Serv., Lawrence, Kans.		LeBlond	370 hr.	325 hr.	2250
Port Columbus Flyg. Serv., Port Columbus, O.	G	Lambert	941 hr.	160 hr.	1600
EAGLEROCK					
Thompson Flyg. Serv., Salt Lake City, Utah.		Wright J5	1049 hr.	149 hr.	1000
A. Whitaker, Swan Isl. Arpt., Portland, Ore.		Wright	1035hr.	50 hr.	750
J. O. Dockery, Stuttgart, Ark.		Hisso 180	800 hr.	70 hr.	550
EMSCO					
A. Whitaker, Swan Isl. Arpt., Portland Ore.		Chall. 185	600 hr.		650

FLYING and POPULAR AVIATION USED PLANE LISTING OF

DEALERS	MODEL AND ENGINE		TIME	OVER-HAULED	PRICE
FAIRCHILD					
Bob Wight, Box 487, Biloxi, Miss.	45	Wright 350	165 hr.		$7500
D. H. Wallace, Clarcona, Fla.	24	Warner 145	10 hr.	yes	6000
O. L. Hostetter, York Arpt., Thomasville, Pa.	24	Warner 145	120 hr.		5500
Carolina Aircraft Sales, Mun. Arpt., Charlotte, N. C.	24	Warner 145	130 hr.	new	5500
McBoyle Cub Sales, Arpt., Lake Delton, Wis.	24	Warner 145	140 hr.		4500
Bob Wight, Box 487 Biloxi, Miss.	24	Warner 145	175 hr.	yes	3995
T. A. Culbertson, Medford, Oregon	246	Warner 145	800 hr.	350 hr.	3500
Colorado Aviation, Denver, Colo.		Warner 145	470 hr.	50 hr.	3150
Leech Arcrft., Inc., Roosevelt Field, Mineola, N. Y.		Ranger 145	959 hr.	245 hr.	2600
InterCity Airlines, Arpt., E. Boston, Mass.		Warner 145	1200 hr.	150 hr.	2500
Somerset Hills Arpt., Basking Ridge, N. J.	24	Warner 145	490 hr.	425 hr.	2400
Neil McCray Arprt., Jamestown, N. Y.		Ranger	480 hr.	350 hr.	2350
InterCity Airlines, Arpt., E. Boston, Mass.		Ranger 145	550 hr.	150 hr.	2250
St. Louis Fly. Serv., Lambert Fld., Robertson, Mo.		Warner 125	350 hr.	35 hr.	2250
California Aircraft Corp., Van Nuys, Cal.	24	Warner 145	400 hr.	none	2250
Schneider Aero Serv., Fresno, Calif.		Warner 145	954 hr.	206 hr.	2150
West Coast Aircraft, Inglewood, Calif.	24	Warner 145	755 hr.	227 hr.	2150
Chicago Aviation Corp., Glenview, Ill.	24	Warner 125	490 hr.	390 hr.	1595
Walz Corp. Central Arpt., Camden, N. J.	22	Cirrus 95	973 hr.	210 hr.	1450
Harrisburg Air Serv., Harrisburg, Pa.		Wright	800 hr.	200 hr.	1100
M. T. Anderson, Lincoln Arpt., Lincoln Park, N.J.	24	Cirrus 90	506 hr.	4 /40	900
A. Whitaker, Swan Is. Arpt. Portland, Ore.	24	Cirrus	895 hr.	50 hr.	850
Ong Aircraft Corp., P.O. Box 214, Kansas City, Mo.	FC2	Wright 55	1350 hr.	1275 hr.	600
FLEET					
Lynchburg Corp., Preston Glenn Arpt., Lynchburg, Va.	7	Kinner 125		yes	2250
H. A. Hammill, Box 922, Austin, Tex.		Warner 125	700 hr.	35 hr.	1500
Ong Aircraft Corp., P.O. Box 214, Kansas City, Mo.	"2"	Kinner 100	2250 hr.	2206 hr.	1250
FRANKLIN					
North West Jersey Air Service, Clinton, N. J.	Sport	Lambert 90	600 hr.	May 40	700
FUNK					
Bailey Flyg Serv., Corning, N. Y.		Funk 83	84 hr.	none	1665
Sky Sport, Cincinnati Arpt., Sharonville, O.		Funk	250 hr.	250 hr.	1500
GREAT LAKES					
Racine Fly. Serv., Arpt., Racine, Wisc.		Cirrus 100	328 hr.	topped	900
United Aero Corp., San Antonio, Tex.		Cirrus 90	450 hr.	435 hr.	800
P. A. Meinke, Willoughby, Ohio		Cirrus	300 hr.	yes	750
HAMMOND					
Perkiomen Valley Arpt., Collegeville, Pa.	Model Y	Menasco 150	180 hr.	just	3200
Burlington Airplane Co., Burlington, Ia.	K5	Kinner			650
KARIKEEN					
Martin & Phipps, 619 W. 7th St., Sioux City, Ia.		Warner 90	350 hr.	none	875
KINNER					
California Aircraft, Van Nuys, Calif.	K-5	Kinner 100	1000 hr	none	1350
KINNER SPORTWING					
Fredericksburg Air Serv., Nottingham Field, Fredericksburg, Va.	B-5	125	900 hr.	700 hr.	1600
Schneider Aero. Serv., Fresno, Calif.		B-5 125	1335 hr.	506 hr.	1350
Louisville Flyg. Serv., Inc., Louisville, Ky.		Kinner K-5	460 hr.		945
LAIRD					
L. O. Dockery, Stuttgart, Ark.		J-5-220	845 hr.	825 hr.	1750
LAMBERT					
Bennett Air Serv., P.O. Box 247, Hightstown, N.J.		Warner 125	270 hr.		1425
LINCOLN					
Peoria Aero Sales Co., 342 Knoxville Ave., Peoria, Ill.	AP	Kinner 125	400 hr.	50 hr.	795
Fox Valley Flyg. Serv., Aurora, Ill.		Kinner	1468 hr.	150 hr.	500
H. B. Chapman, N. Arpt., New Orleans, La.		Kinner 100	985 ship 750 eng.	'39	500
LOCKHEED					
Des Moines Flyg. Serv., Inc., Des Moines, Ia.		Wasp 450	1500 hr.	75 hr.	3500
LOCKHEED VEGA					
H. A. Hammil, Box 992, Austin, Texas		Wasp		15 hr.	5000
LUSCOMBE					
Falcom Aircraft, L.A Mun. Arpt., Inglewood, Cal.	Phantom	Warner 145	new		4000
C. Evers, 247 Park Avenue, N.Y.C.	Seaplane	Cont. 65	23 hr.		3200
C. Evers, 247 Park Avenue, N.Y.C.	Seaplane	Cont. 65	80 hr.		2300
H. S. Smith, 422 S. Union St., Warsaw, Ind.	8A	Lyc. 65	45 hr.		2150
Aircraft Asso. Munic. Arpt., Long Beach, Cal.		Cont. 65	115 hr.		1900
Midwest Av. Sales, Stinson Arpt., La Grange, Ill.		Cont. 65	110 hr.		1900
D. Schall, 33 Claggett Rd., Hyattsville, Md.	8-B	Lyc. 65	35 hr.	new	1895
Massey & Ransom Flyg. Serv., Denver, Colo.		Cont. 65	335 hr.		1875
Jersey Flyg. Serv., Oakland, N. J.		Cont. 65	91 hr.		1850
C. Evers, 247 Park Avenue, N.Y.C.	Landplane	Cont. 65	85 hr.		1800
Midwest Av. Sales, Stinson Arpt., LaGrange, Ill.		Lyc. 65	125 hr.		1800
Walz Corp., Central Arpt., Camden, N. J.		Cont. 65	200 hr.	none	1785
Martin & Phipps, 619 W. 7th St., Sioux City, Iowa		Cont. 65	350 hr.	none	$1775
Ia. Airplane Co., Mun. Arpt., Des Moines, Ia.		Cont. 65	350 hr.	350 hr.	1750
Page Airways, Inc., Rochester N. Y.		Cont. 65	200 hr.	none	1750
Massey & Ransom Flyg. Serv., Denver, Colo.		Cont. 65	350 hr.	60 hr.	1725
Ia. Airplane Co., Mun. Arpt., Des Moines, Ia.		Cont. 65	400 hr.	400 hr.	1700
J. L. Wells, 106 W. Main, Avon Park, Fla.	8A	Cont. 65	95 hr.	none	1675
W. F. Luke, Schenectady, N. Y.		Cont. 65	100 hr.		1657
Iowa Airplane Co., Des Moines, Iowa.	8A	Cont. 65	590 hr.		1650
Massey & Ransom Flyg. Serv., Denver, Colo.		Cont. 65	490 hr.		1650
Consol. Sch. Avia., E St. Louis, Ill.		Cont. 65	180 hr.		1650
Island Crop Dusting Co., Caribou, Maine.	8-A	Cont. 65	400 hr.	300 hr.	1550
Sundorph Aero Corp., Cleveland Arpt., O.		Cont. 50	65 hr.	none	1500
Sharon Air Ser., 347 Vernon Ct., Sharon, Pa.		Cont. 50	250 hr.	just	1450
Hudson Valley Aircraft, Middletown, N. Y.		Cont. 65	60 hr.		1450
Walz Corp., Central Arpt., Camden, N. J.		Cont. 50	235 hr.	none	1375
Northern Air Serv. Arpt., Grand Rapids, Mich.	8-A	Cont. 65	850 hr.	yes	1325
Queen City Flyg. Serv., Cincinnati, Ohio.		Cont. 50	469 eng. 402ship.		1250
Arents Air Ser., Armonk, N. Y.	8	Cont. 50	200 hr.	200 hr.	1200
MONOCOACH					
Carnahan Flyg. Serv., Arpt., Bloomington, Ill.		Wright	998 hr.	165 hr.	995
Dewey Eldred Fly. Ser., Lost Nation Rd., Willoughby, Ohio		Wright J67			600
MONOCOUPE					
Lynchburg Corp., Preston Glenn Arpt., Lynchburg, Va.		Warner 145	275 hr.	yes	1850
B. Belt, 1114 Boundary, Red Oak, Ia.	90-A	Lamb. 90	450 hr.	350 hr.	1850
N. E. McCray, Jamestown, N. Y.		Lambert 90	375 hr.	300 hr.	1750
Arents Air Serv., Armonk, N. Y.	90A	Lambert 90	400 hr.	225 hr.	1700
Cape Aircraft, Inc., Hatchville, Mass.		Lambert 90	340 hr.	340 hr.	1550
Chicago Aviation, Curtiss Arpt., Glenview, Ill.	90	Lambert 90	495 hr.	420 hr.	1295
Aero Serv. Inc., McKinley Arpt., Canton, O.	125	Warner 125	800 hr.	100 hr.	1250
Oakland Aircraft, Alameda, Cal.		Lambert 90	688 hr.	Feb. '39	850
Huron Flyg. Serv., Huron, So. Dakota.		Lambert	788 hr.		695
MOTH					
Carl Evers, 247 Park Ave., N.Y.C.		Gipsy Major 130	new		2800
NEW STANDARD					
Oneal Aircraft, Vincennes, Ind.		J-5	700 hr.	20 hr.	1550
NICHOLAS-BEAZLEY					
Sedalia Fly. Serv., 103 N. Ohio, Sedalia, Mo.	8	Genet	360 hr.	300 hr.	525
Dubuque Airways, Dubuque, Iowa.		Genet 80	400 hr.	60 hr.	525
PARKS					
Hylan Flyg. Serv., Rochester, N. Y.		Wright 175	514 hr.	150 hr.	1250
PIPER CUB					
Odessa Flyg. Serv., Odessa, Texas.	J-4A	Cont.	110 hr.	none	2150
D. H. Wallace, Clarcona, Fla.	Coupe	Cont. 65	60 hr.	new	2000
L-H Air Serv., P.O. Box 93, Hatboro, Pa.	Cub Coupe	Cont. 65	150 hr.	no	1900
W. Blood Aircraft Sales, Charleston, W. Va.	J-4	Cont. 65	75 hr.	new	1900
Stiles Motor Co., 260 Main St., Northport, N. Y.	J44	Cont. 65	67 hr.		1900
Bennett Air Serv., P.O. Box 247, Hightstown, N. J.	Cub Coupe	Cont. 65	130 hr.		1850
McBoyle Cub Sales, Arpt., Lake Delton, Wisc.	Coupe	Cont. 65	75 hr.	new	1850
Lynchburg Corp., Preston Glenn, Lynchburg, Va.	Coupe	Cont. 65		none	1850
Sedalia Fly. Serv., 103 N. Ohio, Sedalia, Mo.	Cruiser	Cont. 75	60 hr.		1800
Susquehanna Air Ser., Montoursville, Pa.	J5	Lyc. 65	29 hr.		1795
Des Moines Flyg. Serv., Des Moines, Ia.	Coupe	Cont. 65	96 hr.	new	1775
Des Moines Flyg. Serv., Des Moines, Ia.	Coupe	Cont. 65	87 hr.	new	1775
Lynchburg Corp., Preston Glenn, Lynchburg, Va.	Coupe	Cont. 65	125 hr.	yes	1750
Strickland-Horner Air Serv., Arpt., Alva, Okla.	Cub J4	Cont. 65	130 hr.	top	1700
Skelly Fly. Serv., Arpt., Greenville, Penna.	Coupe J4	Cont. 65	85 hr.	new	1695
Matthews & Rappaport, Mineola, L. I., N. Y.	J-4	Cont. 65	125 hr.		1675
Al Young, Somerset Pike, Johnstown, Pa.	Cruiser	Cont. 75	113 hr.		1675
Wright Fly. Serv., Scott Arpt., Martins Ferry, O.	Coupe '40	Cont. 65	330 hr.	10	1675
Bethany Air Serv., Inc., Bethany, Conn.		Cont.	78 hr.		1650
Hudson Valley Aircraft, Middletown, N. Y.		Cont. 65	28 hr.		1650
Krantz Aero Serv., Pt. Erie Arpt., Erie, Pa.	Coupe	Cont. 65	110 hr.	110 hr.	1600
Woodlawn Balto. Co., Baltimore, Md.	Coupe	Cont. 65	153 hr.		1595
Clovis Flyg. Serv., Clovis, N. M.		Cont. 65	100 hr.	none	1575
Aviation Ser., Inc., Arpt., Newport News, Va.	J-5	Cont. 75	76 hr.		1575
R. E. Lee, Munic. Arpt., Rocky Mount, N.C.	Coupe J4	Cont. A 65	120 hr.	no	1550
Eno Fly. Serv., Arpt., Fort Dodge, Ia.	Coupe '39	Cont. 65	400 hr.	recently	1550
Fredericksburg Air Serv., Fredericksburg, Va.	J-4	Cont. 65	450 hr.	15 hr.	1550
Southern Air Serv., Memphis, Tenn.		Cont. 65	100 hr.	new	1550
W. T. Anderson, Lincoln Arpt., Lincoln Park, N.J.	Cruiser	Cont. 75	80 hr.	none	1500
Bethany Air Serv., Bethany, Conn.		Cont.	201 hr.		1500
R. Seidner, Jr., S.A.M. Arpt., Youngstown, O.	Coupe J4	Cont. 65	115 hr.		1495
Hylan Flyg. Serv., Rochester, N. Y.		Cont. 65	450 hr.	25 hr.	1450
Camel City Flyg. Serv., Winston-Salem, N.C.	Coupe	Cont. 65	411 hr.	110 hr.	1400
W. Buel, 102 N. Main, Fremont, Neb.	Coupe	Frank. 60	75 hr.	none	1400
W.Va. Air Serv., County Arpt., Clarksburg, W.Va.	J4A	Cont. 65	580 hr.	no	1375
Ben A. Funk, Robertson, Mo.	J3F50	Frank. 50	700 hr.	200 hr.	1350
M. F. Warrington, Selbyville, Del.	J3	Cont. A55	25 hr.	20 hr.	1350
Racine Fly Serv., Arpt., Racine, Wisc.	Coupe '39	Cont. 65	310 hr.	no	1350
Tennessee Aero Corp., Nashville, Tenn.	Coupe	Cont. 50	48 hr.	none	1350
Al Young, Somerset Pike, Johnstown, Pa.	Trainer	Lyc. 65	37 hr.		1300
Ted Brixius, Columbia, Mo.	Coupe	Cont. 50	196 hr.	none	1295
McBoyle Cub Sales, Arpt., Lake Delton, Wisc.	J3	Franklin 60	68 hr.	new	1275
Bennett Air Serv., P.O. Box 247, Hightstown, N.J.	Coupe	Cont. 50	200 hr.	yes	1250

AUTHORIZED AIRCRAFT DEALERS

DEALERS	MODEL AND ENGINE		TIME	OVER-HAULED	PRICE
Camel City Flyg. Serv., Winston-Salem, N. C.	Coupe	Cont. 50	180 hr.	3 hr.	$1250
Odessa Flyg. Serv., Odessa, Texas	J-3	Frank. 50	405 hr.	none	1250
L. A. Musgrove, Box 814, Morgantown, W.Va.	Coupe	Cont. 65	200 hr.	none	1200
L-H Air Serv., P.O. Box 93, Hatboro, Pa.	J3L-65	Lyc. 65	100 hr.	no	1200
Burlington Airpl. Co., Burlington, Ia.	J3	Frank. 60	60 hr.	new	1200
Barr Aviation Corp., Detroit, Mich.		Cont. 65	230 hr.	none	1200
Northway Flyg. Serv., Columbus, Ohio	J-4	Frank. 60	350 hr.	yes	1200
A. Gillis Flyg. Serv., Great Falls, Mont.	J-3	Cont. 50	300 hr.	none	1200
Palm Beach Aero Corp., W. Palm Beach, Fla.	Coupe	Cont. 65	122 hr.		1195
Al Young, Somerset Pike, Johnstown, Pa.	Trainer	Franklin 60	312 hr.		1175
Eno Fly. Serv., Eno Arpt., Fort Dodge, Ia.	J3L	Lyc. 50	800 hr.	recently	1175
McBoyle Cub Sales, Arpt., Lake Delton, Wisc.	J3	Franklin 50	125 hr.		1150
Maheux's Arpt., Stevens Mill, Auburn, Maine.	J2 Seapl.	Cont. 40	346 hr.		1150
Eno Fly. Serv., Eno Arpt., Fort Dodge, Ia.	J3C	Cont. 50	400 hr.	recently	1150
Va. Cub Distributors, Box 211, Farmville, Va.	Trainer	Frank. 60	300 hr.	no	1150
Geo. C. Haven, Schenectady, N. Y.		Frank. 50	25 hr.	none	1150
A. Gillis Flyg. Serv., Great Falls, Mont.	J-3	Frank. 50	110 hr.	none	1150
Aaron Flyg. Serv., Louisville, Ky.		Frank. 50	85 hr.		1125
Wm. Rannells, Airport, Cumberland, Md.	J3 Trainer	Frank. 60	250 hr.	none	1125
Sedalia Fly. Serv., 103 N. Ohio, Sedalia, O.	J3	Frank. 60	365 hr.	350 hr.	1100
Odessa Flyg. Serv., Odessa Texas	J-3	Frank. 50	864 hr.	169 hr.	1100
A. Gillis Flyg. Serv., Great Falls, Mont.	J-3	Frank. 50	130 hr.	none	1100
Hood Aircraft Sales Co., Northampton Mass.	J3	Cont. 50	165 hr.		1100
Aviation Ser., Inc., Arpt., Newport News, Va.	J3	Lyc. 55	114 hr.		1100
Strickland-Horner Air Serv., Alva, Okla.	J3L	Lyc. 50	520 hr.	just	1075
W.Va. Air Serv., Box 401, Clarksburg, W.Va.	J3F	Frank. 50	160 hr.		1075
West Coast Aircraft, Inglewood, Calif.	J-3	Cont. 50	1250 hr.	none	1075
E. F. Hines, Mex.-Tex. Arpt., Hobbs, N. M.		Frank.	350 hr.	50 hr.	1075
L. Berry, Selman Field, Monroe, La.	Sport J3	Cont. 50	600 hr.	none	1050
Strickland-Horner Air Serv., Arpt., Alva., Okla.	J3F	Frank.	300 hr.	top	1050
Martin & Phipps, 619 W. 7th St., Sioux City, Ia.	J3	Lyc. 55	400 hr.	none	1050
Jersey Flyg. Serv., Oakland, N. J.		Frank. 60	40 hr.	none	1050
Stafford Rogers, Wewoka, Okla.	J3	Frnk. 50	625 hr.	550 hr.	1050
Burlington Airpl. Co., Burlington, Ia.	J3	Lyc. 50	400 hr.	new	1050
Carolina Aircraft Sales, Mun. Arpt., Charlotte, N. C.	J4	Cont. 65D	340 hr.	325 hr.	1050
Ray Wilson, Inc., Parkhill Arpt., Denver, Colo.		Frank.	522 hr.	none	1030
Ray Wilson, Inc., Parkhill Arpt., Denver, Colo.		Frank.	523 hr.	none	1030
Valley Fly. Serv., Rt. 4, Box 132, Visalia, Cal.	J3F	Frank. 50	1100 hr.	10/40	1000
Hawthorne Fly. Serv., Munic. Arpt., Charleston, S.C.		Frank. 60	300 hr.	none	1000
Pekrul's Fly. Serv., Arpt., Traverse City, Mich.	J3	Frank. 50	890 hr.	200 hr.	1000
Va. Cub Dists., Box 211, Farmville, Va.	Trainer	Lyc. 50	300 hr.	no	1000
Page Airways Inc., Rochester, N. Y.		Lyc. 50	450 hr.	none	1000
Utah Pacific Airways, Inc., Ogden, Utah.		Lyc. 55	575 hr.	575 hr.	1000
L. Dethloff, Airport, Willoughby, Ohio.	J-3	Frank.	572 hr.	none	1000
North-West Jersey Air Serv., Clinton, N. J.	J-3	Lyc. 50	165 hr.		1000
Speed's Flyg. Serv., Jackson Hts., N. Y.	J-3	Cont. 50	650 hr.	30 hr.	1000
Ben A. Funk, Robertson, Mo.	J3F50	Frank. 50	650 hr.	150 hr.	1000
Aviation Ser., Arpt., Newport News, Va.	J3	Lyc. 50	449 hr.		1000
Leo Carr, Box 134, Charleston, Mo.	Trainer	Frank. 50	200 hr.	no	1000
Aviation Ser. Arpt., Newport News, Va.	J3	Lyc. 50	761 hr.	157 hr.	1000
Stafford Rogers, Wewoka, Okla.	J3	Frank. 50	700 hr.	600 hr.	1000
L. Berry, Selman Field, Monroe, La.	Trainer J3	Lyc. 50	1100 hr.	none	995
Lexington Flyg. Serv., Lexington, Ky.		Frank.	180 hr.	none	995
Lane Aviation Corp., Arpt., Cleveland, O.	Coupe	50	130 hr.		975
Lexington Flyg. Serv., Lexington, Ky.		Lyc.	560 hr.	none	975
Consol. School Aviation, E. St. Louis. Ill.		Frank. 50	300 hr.		975
Aviation Ser., Inc., Arpt., Newport News, Va.	J3	Lyc. 50	562 hr.		975
Tennessee Aero Corp., Nashville. Tenn.		Frank. 50	250 hr.		970
J. P. Hall, Arpt., West Haven, Conn.	J3C	Cont. A50	390 hr.	250 hr.	950
Skelly's Fly. Serv., Arpt., Greenville, Pa.	Trainer	Lyc. 50	550 hr.	no	950
Clinton Arpt., Elliott Fly. Serv., DeWitt, Ia.	J3	Frank. 50	550 hr.		950
Va. Cub Dists., Box 211, Farmville, Va.	Trainer	Frank. 50	600 hr.		950
Lynchburg Corp., Preston Glenn, Lynchburg, Va.	Trainer	Frank. 50	450 hr.	yes	950
Airways, Inc., Waterville, Me.		Frank. 50	240 hr.		950
Mississippi Airways, Jackson, Miss.		Cont. 50	615 hr.	May '40	950
Frost Air Serv., W. Haven, Conn.		Cont. 50	290 hr.	none	950
Northway Flyg. Serv., Columbus, Ohio.	J-3	Cont. 50	325 hr.		950
Northway Flyg. Serv., Columbus, Ohio.	J-3	Frank. 50	380 hr.		950
Hood Aircraft Sales Co., Northampton, Mass.	J3	Cont. 50	370 hr.	70 hr.	950
Schuylkill Arpt., Orweigsburg, Pa.	J4	Cont. 55	200 hr.	Aug. '40	950
Wm. Rannells, Airport, Cumberland, Md.	J3 Trainer	Frank. 50	500 hr.	none	925
R. Wilson Inc., Parkhill Arpt., Denver, Colo.		Frank.	640 hr.	none	910
Hawthorne Fly. Serv., Munic. Arpt., Charleston S.C.		Frank. 60	750 hr.	100 hr.	900
P. D. Eyster, TriState Arpt., Angola, Ind.	J3	Frank. 60	450 hr.		900
Red Bank Arpt., Red Bank, N. J.	J3	Cont. 50	895 hr.	5/30	900
W.T. Anderson, Lincoln Arpt., Lincoln Park, N.J.	J3L	Lyc. 55	200 hr.	none	900
Strickland-Horner Air Serv., Arpt., Alva, Okla.	J3-39	Cont. Dual 50	660 hr.	top	900
P. D. Eyster, TriState Arpt., Angola, Ind.	J3	Frank. 50	450 hr.		900
P. D. Eyster, TriState Arpt., Angola, Ind.	J3	Frank. 50	450 hr.		900
Bethany Air Serv., Bethany, Conn.		Lyc.	510 hr.	110 hr.	900
Southern Air Serv., Memphis, Tenn.		Lyc. 50	300 hr.	new	900
Utah Pacific Airways, Inc., Ogden, Utah.		Cont.50	500 hr.	25 hr.	900
Susquehanna Air Ser., Montoursville, Pa.	J3	Lyc. 55	1050 hr.	450 hr.	895
Aaron Flyg. Service, Louisville, Ky.		Frank. 50	460 hr.	Jan. '40	895
J. C. Gendron, Ironwood, Mich.	Sport J3	Frank. 50	325 hr.	50 hr.	895
Northway Flying Serv., Columbus, Ohio.	J-3	Frank. 50	650 hr.		880
L. Berry, Selman Field, Monroe, La.	J3	Frank. 50	800 hr.	75 hr.	875
Skelly's Fly. Serv., Arpt., Greenville, Pa.	Trainer	Lyc. 50	800 hr.	no	875
L.A. Musgrove, Box 814, Morgantown, W.Va.	J3	Frank.	500 hr.	50 hr.	850
Jersey Flyg. Serv., Oakland, N. J.		Frank. 50	265 hr.	5 hr.	850
Ranger Flyg. Serv., Ranger, Texas	J3F	Frank. 50	775 hr.	July '40	825
Red Bank Arpt., Red Bank, N. J.	J3 (2)	Cont. 50	450 hr.	never	800-850
L.A Musgrove, Box 814, Morgantown, W.Va.	J3	Lyc. 50	500 hr.	100 hr.	800
Ranger Flyg. Serv., Ranger. Texas	J3F	Frank. 50	1000 hr.	Apr. '40	800
Ranger Flyg. Serv., Ranger, Texas	J3F	Frank. 50	775 hr.	May '40	800
Schuylkill Arpt. Co., Orweigsburg, Pa.	J3F	Frank. 50	700 hr.	Mar. '40	800

DEALERS	MODEL AND ENGINE		TIME	OVER-HAULED	PRICE
Wright Fly.Serv.,ScottArpt., Martins Ferry,O.	J3	Lyc. 50	840 hr.	240 hr.	$ 775
Jenkins Air Serv., Rochester, N. Y.		Cont. 40	450 hr.	25 hr.	775
Martin & Phipps,619 W.7th St.,Sioux City,Ia.	J2	Cont. A 40	400 hr.	recently	765
Zimmerly Bros., Lewiston, Idaho	J-3	Cont. 40	1335 hr.	1242 hr.	750
A. Whitaker, Swan Is. Arpt., Portland, Ore.	J-2	Cont. 40	500 hr.	none	750
United Flyers Inc., Ridgewood, N. J.	J-3	Cont. 40	200 hr.		750
Ranger Flyg. Serv., Ranger, Texas	J3F	Frank. 50	1100 hr.	Jan. '40	750
A. Gillis Flyg. Serv., Great Falls, Mont.	J-2	Cont. 40	350 hr.	none	750
H. S. Smith, 422 S. Union St., Warsaw, Ind.	J3	Cont. 40	376 hr.	40 hr.	750
Burlington Airplane Co., Burlington, Ia.	J2	Cont. A40	650 hr.		750
Blvd. Arpt., Roosevelt Blvd., Philadelphia, Pa	J2	Cont. 40	250 hr.	100 hr.	700
Carolina Aircraft Sales, Munic. Arpt., Charlotte, N. C.	J2	Cont. 40	750 hr.	700 hr.	700
L. E. Smith, Sterling, Colo.	J3 Sport	Cont. 40	325 hr.	just	700
Hudson Valley Aircraft, Middletown, N. Y.		Cont. 40	300 hr.		700
Woodlawn Balto Co., Baltimore, Md.	J-3	Cont. 40	376 hr.	120 hr.	695
Hood Aircraft Sales Co., Northampton, Mass.	J2	Cont. 40	400 hr.	19 hr.	695
Hood Aircraft Sales Co., Northampton, Mass.	J2	Cont. 40	600 hr.		695
Allstate Airways, Newton Rd., Haverhill, Mass.		Cont. A-40	600 hr.	100 hr.	675
A. Whitaker, Swan Is. Arpt., Portland, Ore.	J-2	Cont. 40	895 hr.	50 hr.	675
Calkins Arcft.,1022 N.Atlantic,Seattle, Wash.		Cont. 40	800 hr.	17 hr.	675
Oakland Arcft, Alameda, Cal.	J-2	Cont. 40	1785 hr.	May '40	665
Southern Airways Co., Munic. Arpt., Birmingham, Ala.		Cont. 40	250 hr.	7/40	650
Allied Arcft, Davenport, Ia.		Cont. 40	385 hr.	100 hr.	650
Bayside Flyg. Serv., Hingham, Mass.	J-3	Cont. 40	800 hr.	110 hr.	650
Harrisburg Air Serv., Harrisburg, Pa.		Cont.	200 hr.	8 hr.	650
Calkins Arcft.,1022 N.Atlantic,Seattle, Wash.		Cont. 40	1467 hr.	138 hr.	650
Jones Flyg. Serv., Columbus, Ohio.	J-3	Cont. 40	700 hr.	400 hr.	650
Frost Air Serv., West Haven, Conn.		Cont. 40	355 hr	recently	625
Calkins Arcft.,1022 N.Atlantic,Seattle, Wash.	J-2	Cont. 40	854 hr.	263 hr.	625
R. E. Lee, Munic. Arpt., Rocky Mount, N. C.	J2	Cont. A40-4	520 hr.	8/40	600
Clinton Arpt., Elliott Fly. Serv., DeWitt, Ia.	J2	Cont. 40	900 hr.	100 hr.	600
W.Va. Air Serv., Box 401, Clarksburg, W.Va.	J3C	Cont. 40	500 hr.	10 hr.	600
W. B. Jones, Arpt., Marlboro, Mass.	J2	Cont. 40		50 hr.	600
G. E. Moon, Airport, Mishawaka, Ind.	J-2	Cont. 40	150 hr.	none	600
Fox Valley Flyg. Serv., Aurora, Ill.		Cont.	850 hr.	150 hr.	600
J. A. Field, 17 Forman St., Bradford, Pa.	J-2	Cont. 40	315 hr.	5 hr.	600
Carolina Aircraft Sales, Munic. Arpt., Charlotte, N. C.	J2	Cont. 40	900 hr.	850 hr.	600
B. F. Dodson, 121 S. Iuka St., Pratt, Kan.	J3	Cont. A40A	660 hr.	617 hr.	600
Bayside Flyg. Serv., Hingham, Mass.	J-2	Cont. 40	850 hr.	50 hr.	595
West Coast Aircraft, Inglewood, Calif.	J-2	Cont. 40	250 hr.	250 hr.	595
Krantz Aero Serv., Pt. Erie Arpt., Pt. Erie, Pa.	J-2	Cont. 40	525 hr.	125 hr.	585
Livingston Airways, Arpt., Waterloo, Ia.	J2	Cont. 40	770 hr.	92 hr.	575
D. Rohn, 1300 Monroe, Beardstown, Ill.		Cont.	550 hr.	50 hr.	575
Wm. Rannells, Airport, Cumberland, Md.	J2 Trainer	Cont. 40	600 hr.	500 hr.	575
Southern Airways, Munic. Arpt., Birmingham, Ala.		40	700 hr.	9/1/40	550
Chas. Roberts, Mun. Arpt., Dothan, Ala.		Cont. 40	400 hr.	Mar. '40	550
L. Marshall, 1671 Haddon Av., Camden, N. J.	J2	Cont. 40	1000 hr.	Aug. '40	550
Bishop Fly. Ser. Arpt., Flint, Mich.		Cont. A40	600 hr.	35 hr.	550
Allstate Airways, Newton Rd., Haverhill, Mass.		Cont. A40	675 hr.	125 hr.	525
Daitz Fly. Corp., Roosevelt Field, Mineola, N. Y.	J2	Cont. 40	600 hr.	24 hr.	525
W. Blood Aircraft Sales, Charleston, W. Va.	J-2	Cont. 40	560 hr.	80 hr.	525
C. Breedlove, 2406-27th St., Lubbock, Tex.	J2	Cont. 40	700 hr.	35 hr.	500
D. H. Wallace, Clarcona, Fla.	J-2	Cont. 40	500 hr.	Apr. '40	500
Aviation Service, Hartford, Conn.	E-2	Cont. 40	998 hr.	283 hr.	500
Aviation Service, Hartford, Conn.	E-2	Cont. 40	323 hr.	285 hr.	500
R. Boekenhoff, Jr., 626 Maine, Quincy, Ill.	J2	Cont. 37	850 hr.	Aug. '40	500
PITCAIRN					
Blvd. Arpt., Roosevelt Blvd., Philadelphia, Pa.	PA-7	Wright 140	354 hrs.	no	1800
PORTERFIELD					
Lenhart Fly. Ser., Munic. Arpt., Marion, Ind.	Deluxe	Warner 90	240 hr.	just	1495
Speed's Flyg. Serv., Holmes Arpt., Jackson Hts., N. Y.		Cont. 50	105 hr.		1200
Bethany Air Serv.,Inc.,Amity Rd.,Bethany,Conn.		LeBlond	178 hr.		900
Geo. C. Haven, Schenectady, N. Y.		LeBlond 70	450 hr.	100 hr.	895
Livingston Airways, Arpt., Waterloo, Ia.		LeBlond 70	349 hr.	127 hr.	875
W. F. Luke, Schenectady, N. Y.		LeBlond 70	450 hr.	100 hr.	800
Inter-City Fly. Ser., Munic. Arpt., Fort Wayne, Ind.		LeBlond 70	415 hr.	July '39	800
Hawthorne Fly. Serv., Munic. Arpt., Charleston, S.C.		LeBlond 70	350 hr.		795
S. P. Hale, Jr., 309 F St., Ardmore, Ohio.	Flyabout	LeBlond 70	750 hr.		775
Dawson Air Serv., Salina, Kans.		LeBlond	not given	Apr. '40	695
Airways, Inc., Waterville Me.		Cont. 40	68 hr.	new shp.	595
REARWIN					
Al Young, Somerset Pike, Johnstown, Pa.	Ranger	Cont. 75	none		2295
C. Evers, 247 Park Ave., N.Y.C.		Warner 90	138 hr.	none	2250
Falcon Aircraft, L. A. Mun. Arpt., Inglewood, Cal.	Speedster	Menasco 125	150 hr.		2250
Falcon Aircraft, L. A. Mun. Arpt., Inglewood, Cal.	Sportster	LeBlond 90	450 hr.	recently	1700
California Aircraft, Van Nuys, Ca.	Sportster	LeBlond 90	469 hr.		1675
E. W. Wiggins Airways, Providence, R. I.		LeBlond 90	400 hr.	130 hr.	1400
A. E. Padage, Tri-City Arpt., Wisc.Rapids, Wis.	90	LeBlond	178 hr.	73 hr.	1350
Four Lakes Aviation, Madison, Wisc.	7000	LeBlond 70	300 hr.		1150
Jennings Bros., No. Grafton, Mass.		LeBlond 70	680 hr.	50 hr.	1075
Airways, Inc., Waterville, Me.		LeBlond 85	280 hr.	new ship	1000
St. Louis Fly. Serv., Lambert Field, Robertson, Mo.		LeBlond 70	500 hr.	recently	995
Racine Fly. Serv., Arpt., Racine, Wisc.	7000	LeBlond 70	540 hr.	10 hr.	950
P. A. Meinke, Willoughby, O.		LeBlond 85			950

FLYING and POPULAR AVIATION USED PLANE LISTING OF

DEALERS	MODEL	AND ENGINE	TIME	OVER-HAULED	PRICE
Aircraft Assoc., Inc., Munic. Arpt., Long Beach, Cal.	7000	LeBlond 70	1580 hr.	1150 hr.	$900
N. R. McCray, Airport, Jamestown, N. Y.		LeBlond 70	890 hr.	760 hr.	895
Chgo. Aviation, Curtiss Arpt., Glenview, Ill.	70	LeBlond 70	490 hr.	400 hr.	850
Aircraft Assoc., Inc., Munic. Arpt., Long Beach, Cal.	7000	LeBlond 70	1400 hr.	1350 hr.	850
ROBIN					
Utah Pacific Airways, Inc., Ogden, Utah		J-6-5	1075 hr.	25 hr. eng.	1100
Raymond Aero. Service Co., Macon, Ga.		Wright	800 hr.	Nov. '39	950
Clovis Flyg. Serv., Clovis, N. M.		J-6-5	600 hr.	Feb. top	850
Red Bank Arpt., Red Bank, N.J.		Challenger	475 hr.	250 hr.	650
Fox Valley Flyg. Serv., Aurora, Ill.		Chall.	870 hr.	35 hr.	575
RYAN					
St. Louis Fly. Serv., Lambert Field, Robertson, Mo.	St-A	Menasco 125	508 hr.	127 hr.	3250
Mid-Western Aviation Co., St. Joseph, Mo.	B-1	J-5-220	630 hr.	8 hr.	995
J. L. Schroeder, Houston, Texas	B-1	Wright 220	634 hr.	21 hr.	875
J. O. Dockery, Stuttgart, Ark.		J-5	600 hr.	100 hr.	850
Oneal Aircraft Vincennes, Ind.		J-5	950 hr.	200 hr.	850
SECURITY					
Aviation Service Co., Hartford, Conn.	S1A	Kinner 100	940 hr.	146 hr.	850
Aviation Service Co., Hartford, Conn.	S1A	Kinner 100	936 hr.	165 hr.	850
SIKORSKY					
E. W. Wiggins Airways, Providence, R. I.		S-39	400 hr.	recently	7500
Palm Beach Aero, Marrison Fd., W. Palm Beach, Fla.	S38B	Wasp 450	125 hr.	yes	5995
Gilpin Airlines, Arpt., Tucson, Ariz.	S-39CS	Wasp, Jr. 375	550 hr.	275 hr.	5600
C. Evers, 247 Park Ave., N.Y.C.	Amphib	Wasp, Jr. 300			3800
SILVARE					
Midwest Av. Sales, Stinson Arpt., LaGrange, Ill.		75	120 hr.	none	2350
SPARTAN					
St. Louis Fly. Serv., Lambert Fld., Robertson, Mo.		Wright 65	516 hr.	1 hr.	8452
Wichita Falls, Air Trans., Wichita Falls, Tex.		Wright 240	330 hr.	110 hr.	900
H. C. Nelson, 3322 Abner Pl., St. Louis, Mo.		Wright	420 hr.	April '35	845
Narragansett Aviation, Hillsgrove, R.I.	L3	Jacobs 55	1500 hr.	none	695
SPORTWING					
Oakland Aircraft, Alameda, Calif.		Kinner 125	640 hr.	Jan. '40	2400
Fredericksburg Air Serv., Fredericksburg, Va.		Kinner 125	900 hr.	200 hr.	1650
STANDARD					
Va. Stinson Dist., R.F.D. 4, Staunton, Va.	D31	Kinner 125		75 hr.	895
STEARMAN					
Upton & Bowen, West Memphis, Ark.		J69-330	500 hr.	50 hr.	1800
Aircraft Assoc., Inc., Munic. Arpt., Long Beach, Cal.	C3B	Wright J5			850
STINSON					
Sioux Skyways, Sioux Falls, S. Dak.		Lyc. 260	235 hr.	235 hr.	7200
Hyannis Arpt., Box 592, Hyannis, Mass.	SR9BD	Lyc. 245	350 hr.	no	6000
W.Va. Air Serv., Box 401, Clarksburg, W.Va.	SR9CD	Lyc. 260	225 hr.	60 hr.	5995
Wright Fly. Serv., Scott Airport, Martins Ferry, Ohio.	SR9	Lyc. 245	540 hr.	55 hr.	5600
Camel City Flyg. Serv., Winston-Salem, N. C.	Reliant	Lyc. 245	889 hr.	245 hr.	4680
P. J. Sones, Haines City, Fla.	SR-9-CD	Lyc. 260	510 hr.	110 hr.	4500
P. J. Sones, Haines City, Fla.	SR-9B	Lyc. 245	630 hr.	230 hr.	4250
Aircraft Unlimited, Hg. 7, Roosevelt Fld., Mineola, N. Y.	SR 8-B	Wright 350	120 hr.	10/40	4000
Narragansett Aviation, Hillsgrove, R. I.	105	Cont. 80	150 hr.	none	3695
Franklin Rose Aircraft, Alameda, Cal.	10	Cont. 80	225 hr.		3650
Franklin Rose Aircraft, Alameda, Cal.	10	Cont. 80	50 hr.		3450
Portland Flyg. Serv., Portland, Me.	105	80 hp	110 hr.	none	3250
Aircraft Assoc., Inc., Munic. Arpt., Long Beach, Cal.	SR7B	Lyc. 245	839 hr.		3250
J. A. Atherton, Arpt., Rochester, Minn.		Cont. 80	70 hr.		3000
Chgo. School of Aero., Mt. Prospect, Ill.	SR-6B	Lyc. 245	970 hr.	100 hr.	2995
Chicago Aviation Corp., Glenview, Ill.		Lyc. 245	1000 hr.	300 hr.	2800
Leech Aircraft, Roosevelt Fld., Mineola, N. Y.	105	Cont. 75	235 hr.		2800
Leech Aircraft, Roosevelt Fld., Mineola, N. Y.	105	Cont. 80		60 hr.	2800
S. P. Hale, Jr., 309 F St., Ardmore, Ohio.	105	Cont. 75	160 hr.	just	2650
R. Turner Aero Corp., Indianapolis, Ind.		Cont. 75	165 hr.	none	2600
Geo. C. Haven, Schenectady, N. Y.		Cont. 75	90 hr.	none	2550
Sioux Skyways, Sioux Falls, S. Dak.		Cont. 75	225 hr.	25 hr.	2500
Gent. Aero. Corp., 1717 Ford Bldg., Detroit, Michigan.	105	Cont. 75	96 hr.		2450
Air Serv. Inc., Mun. Arpt., Denver, Colo.	105	Cont. 75	120 hr.		2400
Air Ser. Inc., Munic. Arpt., Denver, Colo.	105	Cont. 75	200 hr.	no	2400
Sharon Air Ser., 347 Vernon Ct., Sharon, Pa.		Cont. 75	250 hr.	none	2400
J. K. Hinson, Rutherford Fld., Woodlawn, Md.	SR6	Lyc. 225	1037 hr.	225 hr.	2390
Jenkins Air Serv., Inc., Rochester, N. Y.		Cont. 75	170 hr.		2350
Upton & Bowen, W. Memphis, Ark.	105	Cont. 75	250 hr.	50 hr.	2350
P. J. Sones, Haines City, Fla.	SR-6B	Lyc. 245	565 hr.	165 hr.	2350
Chgo. School of Aero, Mt. Prospect, Ill.	105	Cont. A-75	390 hr.	370 hr.	2345
G. L. Williams, Syracuse Arpt., Syracuse, N.Y.		Cont. 75	200 hr.		2300
G. L. Williams, Syracuse Arpt., Syracuse, N.Y.	105	Cont. 75	225 hr.		2300
Bishop Fly. Ser., Arpt., Flint, Mich.	105	Cont. 75	140 hr.	no	2300
A. R. Currey, 452 Jefferson, Galesburg, Ill.	105	Cont. 75	500 hr.		2250
Safair, Roosevelt Fld., Mineola, N. Y.	SR6	Lyc. 245	95 hr.		2250
Eno Fly. Serv., Eno Arpt., Fort Dodge, Ia.	SR6	Lyc. 245	450 hr.	recently	2250
Franklin Rose Aircraft, Alameda, Cal.	SR5	Lyc. 260	2500 hr.	July '40	2250

DEALERS	MODEL	AND ENGINE	TIME	OVER-HAULED	PRICE
Hangar Six, Inc., Stinson Bldg., San Antonio, Tex.	105	Cont. 75	267 hr.	none	$2250
P. J. Sones, Haines City, Fla.	105	Cont. 75	220 hr.	none	2250
Northern Okla. Fly. Serv., Blackwell, Okla.	SR5E	Lyc. 225	975 hr.	675 hr.	2000
Raymond Aero Serv. Co., Airport, Macon, Ga.		Wasp Jr.	950 hr.	Mar. '38	2000
Genl. Aero. Corp., 1717 Ford Bldg., Detroit, Michigan	105	Cont. 75	635 hr.	162 hr.	1975
Genl. Aero. Corp., 1717 Ford Bldg., Detroit, Michigan	105	Cont. 75	708 hr.	289 hr.	1975
K. S. Barber, Munic. Arpt., Pontiac, Mich.	105	Cont. 75	630 hr.	160 hr.	1950
Hawthorne Fly. Serv., Munic. Arpt., Charleston, S. C.	SR5A	Lyc. 245	850 hr.	just	1900
Morey Airplane Co., Madison, Wisc.		Lyc.	800 hr.	350 hr.	1900
Nashville Fly. Ser., Munic. Arpt., Nashville, Tenn.	SR33	Lyc. 215	1700 hr.	yes	1900
Hume & Smyer, Bx. 551, Arkansas City, Kans.	SR6	Lyc. 245	527 hr.	330 hr.	1875
J. Frank Wilson, New Kingstown, Pa.	SR-SR	Lyc. 225	650 hr.	450 hr.	1800
Miller Flyg. Serv., North Benton, Ohio.		Lyc. 225	565 hr.	May '39	1800
St. Louis Fly. Serv., Lambert Fld., Robertson, Mo.		Lyc. 215	1175 hr.	158 hr.	1750
Page Airways, Inc., Rochester, N. Y.		Lyc.	1500 hr.	250 hr.	1750
Moberly Flyg. Serv., Moberly, M.		Lyc.	1220 hr.	30 hr.	1650
Wright Fly.Serv.,Scott Arpt.,Martins Ferry, O.	1933	Lyc. 215	1100 hr.	245 hr.	1525
Brayton Flyg. Serv., Robertson, Mo.		Lyc.	738 hr.	126 hr.	1450
Chgo. School of Aero, Mt. Prospect, Ill.	Reliant	Lyc. 215	1100 hr.	350 hr.	1445
Akron Airways, Arpt., Akron, Ohio.	SR	Lyc.	850 hr.	350 hr.	1350
Harrisburg Air Serv., Harrisburg, Pa.		Lyc.	700 hr.	175 hr.	1300
J. L. Schroeder, Rt. 3, Box 117, Houston, Tex.	Reliant	Lyc. 215	460 hr.	no	1250
Canton Aviation Co., Canton, Ohio.		Lyc. 215		yes	1200
Springfield Aviation, Arpt., Springfield, Ill.	SM-8A	Lyc. 215	760 hr.	360 hr.	1175
E. F. Turner, Airport, Spartanburg, S. C.	S	Lyc. 680	800 hr.	150 hr.	1150
Livingston Airways, Arpt., Waterloo, Ia.	SM8A	Lyc. 215	934 hr.	180 hr.	1050
DuBois Aviation Assoc., Munic. Arpt., DuBois, Pa.	S	Lyc. 215	1043 hr.	821 hr.	1045
Perkiomen Valley Arpt., Collegeville, Pa.	SM8A	Lyc. 215	1175 hr.		1000
Odessa Flyg. Serv., Odessa, Texas.	SM-2AB	Wright 220	1767 hr.	none	1000
Four Lakes Aviation, Madison, Wis.	SM-2AA	Wright 65	485 hr.	85 hr.	1000
C. A. Lewis, 776 S. Maffit St., Decatur, Ill.	SMIF	Wright 330	805 hr.	220 hr.	1000
Maheux's Arpt., Stevens Mill Rd., Auburn, Me.	SM8A	Lyc. 215			995
Livingston Airways, Arpt., Waterloo, Ia.	R	Lyc. 215	3144 hr.	251 hr.	975
E. Brockenbrough, Munic. Arpt., Charlotte, N. C.	S	Lyc. 215	900 hr.	700 hr.	975
E. Braden, Easton Arpt., Easton, Pa.	SM7A	Wright 330	750 hr.		950
G & R Air Serv., 600 N. Columbus, Alexandria, Va.		Lyc. 215	1250 hr.	105 hr.	950
Barr Aviation Corp., Detroit, Michigan.		Lyc. 215	890 hr.	5 hr.eng.	950
Decatur Aviation,776 S.Maffit St.,Decatur,Ill.	SM1F	Wright 330	825 hr.	250 hr.	895
P. D. Eyster, TriState Arpt., Angola, Ind.	SM8A	Lyc. 215	1200 hr.	200 hr.	890
Island Crop Dusting Co., Caribou, Maine.	SM1-D	Wright 225	500 hr.	30 hr.	800
Midwest Av. Sales, Stinson Arpt., LaGrange, Ill.	SM8A		2025 hr.	yes	800
Glens Falls Fly. Ser., Arpt., Glens Falls, N. Y.	SM8A	Lyc. 215	775 hr.	175 hr.	800
Northway Flyg.Serv.,Norton Fld.,Columbus,O.	SM2AB	Wright 220	1200 hr.	Dec. '39	775
STUDENT PRINCE					
Buroker-Hicks Flyg. Serv., Olympia, Wash.	2-POLB	Cirrus 100	650 hr.	none	800
Tacoma Flyg. Serv., South Tacoma, Wash.		Cirrus 100	650 hr.	125 hr.	850
SWALLOW					
Galvin Fly. Ser., Boeing Fld., Seattle, Wash.		Wright 240	800 hr.	100 hr.	1000
TAYLORCRAFT					
C. H. Kenyon, Grand Mere, Quebec.		Lyc. 55	93 hr.	none	1900
Little Corp. Patco Fly. Fld., Norristown, Pa.	Deluxe	Cont. 65	35 hr.		1900
Springfield Aviation, Arpt., Springfield, Ill.	BC	Cont. 65	140 hr.	none	1895
C. Breedlove, 2406-27th St., Lubbock, Texas	BL	Lyc. 65	175 hr.	none	1750
C. Breedlove, 2406-27th St., Lubbock, Texas	BC	Cont. Dual 65	235 hr.	none	1750
Bishop Fly. Ser., Arpt., Flint, Mich.		Lyc. 65	50 hr.	new	1750
United Flyers, Inc., Ridgewood, N. J.	BL deluxe	Lyc. 65	165 hr.		1750
Leavens Bros., Barker Arpt. Toronto, Can.		Cont. 50	614 hr.		1750
C. Breedlove, 2406-27th St., Lubbock, Texas	BL	Lyc. 65	300 hr.	10 hr.	1700
Carnahan Flyg. Serv., Mun. Arpt., Bloomington, Ill.			125 hr.		1700
B. A. Funk, Hangar 50, Grover, Mo.	BL	Lyc. 65	25 hr.	new	1695
Niederhauser Airways, Marshalltown, Ia.	BL	Lyc. 65	209 hr.	no	1650
Washington Pk. Arpt., Homewood, Ill.		Cont. 65	150 hr.	none	1650
Inter-City Fly. Ser., Munic. Arpt., Fort Wayne, Ind.	BC-65	Cont. 65	366 hr.	none	1610
L. E. Daniels, Crete, Ill.		Cont. 65	175 hr.	none	1595
Narragansett Aviation, Hillsgrove, R. I.		Cont. 65	450 hr.	none	1595
Inter-City Fly. Ser., Munic. Arpt., Fort Wayne, Ind.	BL-50	Lyc. 50	115 hr.	none	1525
Howard Travis, Big Rapids, Mich.	BL65	Lyc.	325 hr.		1500
Rochester Aero Corp., Rochester, N. Y.		Lyc.	250 hr.		1500
Fox Valley Flyg. Serv., Aurora, Ill.		Lyc. 65	125 hr.		1500
Ed. Nibur, Madiera Arpt., Bernharts, Pa.		Cont. 65	385 hr.		1500
Merrill Hale, Hillsgrove, R. I.		Cont. 65	490 hr.		1495
W. B. Jones, Arpt., Marlboro, Mass.		Lyc. 65	262 hr.		1475
Fox Valley Flyg. Serv., Aurora, Ill.		Lyc. 65	106 hr.		1475
Peoria Aero Sales, 342 Knoxville, Peoria, Ill.		Lyc. 65	40 hr.	none	1450
W. B. Jones, Arpt., Marlboro, Mass.		Lyc. 55	210 hr.		1450
Ed. Nibur, Madiera Arpt., Bernharts, Pa.		Lyc. 55	120 hr.		1450
Four Lakes Aviation, Madison, Wisc.	BL	Lyc. 65	399 hr.	30 hr.	1450
Aviation Country Club, Cedar Rapids, Ia.	BF	Frank. 50	110 hr.		1450
C. E. Dufort, Malone Arpt., Malone, N. Y.	BL	Lyc. 55	50 hr.	new	1400
Washington Pk. Arpt., Inc., Homewood, Ill.		Lyc. 50	85 hr.	none	1390
Washington Pk. Arpt., Inc., Homewood, Ill.		Lyc. 50	104 hr.	none	1375
Fred Helm, Zap, No. Dakota.	BF	Frank. 50	170 hr.	none	1375
R. Koleman, 921 Hayes Ave., Fremont, Ohio.		Cont. 65	504 hr.	none	1375

AUTHORIZED AIRCRAFT DEALERS

DEALERS	MODEL AND ENGINE		TIME	OVER-HAULED	PRICE
Neiderhauser Airways, Marshalltown, Ia.	BL	Lyc. 65	450 hr.	no	$1350
Hood Aircraft Sales Co., Northampton, Mass.		Cont. 50	200 hr.		1350
Athens Flyg. Serv., Athens, Ga.	BC 3B	Cont. 50	418 hr.	385 hr.	1350
L. E. Daniels, Crete, Ill.	BT	Lyc. 50	125 hr.	none	1325
L. E. Daniels, Crete, Ill.	BT	Lyc. 50	102 hr.	none	1325
Reifenberg Aviation, St. Johns, Pa.		Lyc. 55	138 hr.		1325
Aviation Country Club, Cedar Rapids, Ia.	BC	Cont. 50	318 hr.	18 hr.	1300
Washington Pk. Arpt., Inc., Homewood, Ill.		Lyc. 55	235 hr.	none	1295
Valley Fly. Serv., Rt. 4, Box 132, Visalia, Calif.	BLT	Lyc. 55	400 hr.		1275
Peoria Sales, 342 Knoxville, Peoria, Ill.		Lyc. 50	210 hr.	none	1250
Ryan Air Serv., Decorah, Ia.		Lyc. 50	295 hr.		1250
K. Johannesson Flyg. Serv., Winnipeg, Can.		Cont. 40	800 hr.		1250
Raymond Aero Serv., Macon, Ga.		Lyc.	685 hr.	Mar. '40	1250
Hubert & Dillon Air Serv., Tacoma, Wash.	B	Lyc. 55	1150 hr.	just	1250
Cedar Rapids Airways, Box 183, Cedar Rapids, Ia.		Lyc. 50	260 hr.	yes	1200
J. P. Hall, Arpt., West Haven, Conn.	B	Lyc. 50	450 hr.	new	1200
Balt. School of Aero, Baltimore, Md.		Lyc.	341 hr.		1200
Four Lakes Aviation, Madison, Wisc.	BL	Lyc. 50	490 hr.	none	1200
C. R. Galloway, 3006 Hardie, Ft. Smith, Ark.	Trainer	Lyc. 50	525 hr.	Jul. '40	1200
Gilpin Airlines, Arpt., Tucson, Ariz.	BC	Cont. 50	500 hr.		1200
R. Turner Aero Corp., Indianapolis, Ind.		Frank. 50	247 hr.	top	1200
Greenville Sch. of Avia., Greenville, Ohio.		Lyc. 145	232 hr.	June '40	1200
Dubuque Airways, Dubuque, Ia.	BL	Lyc. 50		none	1200
Hubert & Dillon Air Serv., Tacoma, Wash.	B	Cont. 50	1200 hr.	yes	1200
L. E. Daniels, Crete, Ill.		Lyc. 55	300 hr.	none	1195
J. Frank Wilson, New Kingstown, Pa.	BL	Lyc. 55	250 hr.		1185
Hubert & Dillon Air Serv., Tacoma, Wash.	A	Cont. 40	650 hr.	yes	1150
United Flyers, Ridgewood, N. J.	BF	Frank. 50	220 hr.		1150
Hopewell Flyg. Serv., Hopewell, Va.		Frank. 50	275 hr.	none	1150
A. J. Moore, 324 State St., Baden, Pa.		Lyc. 55	435 hr.	40 hr.	1150
Schneider Aero Serv., Fresno, Cal.		Cont. 50	737 hr.	49 hr.	1150
Canton Aviation, Canton, Ohio.		Lyc. 50	291 hr.	yes	1150
Raymond Aero Serv., Macon, Ga.		Cont.	550 hr.	Nov. '39	1150
Canton Aviation, Canton, Ohio.	BL deluxe	Lyc. 50	300 hr.		1100
Rochester Aero Corp., Rochester, N. Y.		Lyc.	475 hr.	25 hr.	1100
Narragansett Aviation, Hillsgrove, R. I.		Frank. 50	270 hr.	none	1095
Dubuque Airways, Dubuque, Ia.	BL	Lyc. 50	600 hr.	100 hr.	1050
C. E. Dufort, Malone Arpt., Malone, N. Y.	BF	Frank. 50	550 hr.	60 hr.	1050
L. A. Musgrove, Box 814, Morgantown, W.Va.		Lyc. 50	400 hr.	100 hr.	1000
L. A. Musgrove, Box 814, Morgantown, W.Va.		Lyc. 55	600 hr.	200 hr.	1000
L. A. Musgrove, Box 814, Morgantown, W.Va.		Lyc. 50	600 hr.	200 hr.	950
Merrill Hale, Hillsgrove, R. I.		Frank. 50	268 hr.	35 hr.	1050
C. Breedlove, 2406-27th St., Lubbock, Texas	BL Tr.	Lyc. 50	550 hr.	none	950
Dubuque Airways, Dubuque, Ia.	BF	Frank. 50	400 hr.		950
Dewey Eldred Fly. Ser., Lost Nation Rd., Willoughby, Ohio.		Frank. 50			950
Dewey Eldred Fly. Ser., Lost Nation Rd., Willoughby, Ohio.		Lyc. 55			950
E. D. Lyon, RD No. 1, Warren, Ohio.		Lyc. 50	500 hr.	yes	895
Frantz Fly. Serv., Munic. Arpt., Roanoke, Va.		Cont. 40	350 hr.	30 hr.	825
W. F. Luke, Airport, Schenectady, N. Y.		Frank. 50	350 hr.		825
Dennison Arpt. Oper. Co., Arpt., Quincy, Mass.	A	Cont. 40	1000 hr.		800
Jennings Bros., No. Grafton, Mass.		Cont. 40	660 hr.	100 hr.	800
Hubert & Dillon Air Serv., Tacoma, Wash.	A	Cont. 40	950 hr.	yes	800
L. Munroe, Inc., P.O. Bx. 957, Tallahassee, Fla.	A	Cont. 40	225 hr.	25 hr.	800
Aviation Country Club, Cedar Rapids, Ia.	A	Cont. 40	685 hr.	June '40	800
Sioux Skyways, Sioux Falls, So. Dakota.		Cont. 40	600 hr.	65 hr.	785
A. Whitaker, Swan Is. Arpt., Portland, Ore.		Cont. 40	995 hr.	65 hr.	775
Stinson Flyg. Corp., Glendale, Calif.		Cont. 40	1100 hr.	170 hr.	760
Valley Fly. Serv., Rt. 4, Box 132, Visalia, Cal.	A	Cont. 40	650 hr.	no	750
Southern Airways, Munic. Arpt., Birmingham, Ala.		Cont. 40	300 hr.		750
Buroker-Hicks Flyg. Serv., Olympia, Wash.	A-2PCLM	Cont. 40	450 hr.	none	750
Athens Flyg. Serv., Athens, Ga.	3B	Cont. 40	618 hr.	560 hr.	750
Dawson Air Serv., Salina, Kans.		Cont. 40	500 hr.	recently	750
Ryan Air Service, Decorah, Ia.		Cont. 40	326 hr.		750
United Flyers Inc., Ridgewood, N. J.	A	Cont. 40	250 hr.		750
Sky Harbor, Inc., Indianapolis, Ind.	A	Cont. 40	521 hr.	Aug. '39	750
H. S. Smith, 422 S. Union St., Warsaw, Ind.		Cont. 40	800 hr.	100 hr.	750
E. W. Wiggins Airways, Providence, R. I.		Cont. 40	650 hr.	none	735
A. R. Smith, 113 E. Commerce, Aberdeen, Md.		Cont. 40	850 hr.	Oct. '39	725
Sky Sport, Cincinnati Arpt., Sharonville, O.	A	Cont. 40	900 hr.	750 hr.	700
Dewey Eldred Fly. Ser., Lost Nation, Willoughby, O.		Cont. 40			700
Carnahan Flyg. Ser., Bloomington, Ill.		Cont. 40	507 hr.	100 hr.	700
Merrill Hale, Hillsgrove, R. I.		Cont. 40	1081 hr.	100 hr.	695
Susquehanna Air Ser., Montoursville, Pa.		Cont. A40	940 hr.	340 hr.	685
Springfield Aviation, Munic. Arpt., Springfield, Ill.		Cont. 40	308 hr.		675
J. F. Whickir, Mun. Arpt., Ft. Wayne, Ind.		Cont. 40	430 hr.		675
R. E. Lee, Munic. Arpt., Rocky Mount, N. C.		Cont. 40	465 hr.	9/40	650
J. L. Wells, 106 W. Main, Avon Park, Fla.		Cont. 40	690 hr.	100 hr.	650
Howard Fly. Ser., Bx. 565, Ames, Iowa.		Cont. A40	875 hr.	75 hr.	650
Bishop Fly. Ser., Arpt., Flint, Mich.		Cont. A40	800 hr.	50 hr.	650
Aero Serv., McKinley Arpt., Canton, O.	A	Cont. 40	600 hr.	200 hr.	650
United Flyers, Inc., Ridgewood, N. J.	A	Cont. 40	460 hr.	20 hr.	625
Palm Beach Aero Corp., W. Palm Beach, Fla.		Cont. 40	238 hr.		595
Dennison Oper. Co., Dennison Arpt., Quincy, Mass.	A	Cont. 40	1000 hr.	100 hr.	575
Joe Cox, Knox, Indiana.	Chumney	Kinner 90		yes	550
Inter-City Fly. Ser., Munic. Arpt., Fort Wayne, Ind.	A	Cont. 40	625 hr.	600 hr.	550
J. Jones, Munic. Arpt., Lancaster, Pa.	A	Cont. 40	600 hr.		500
TRAVELAIR					
Bayside Flyg. Serv., Hingham, Mass.	6000	Wright 330	1600 hr.	25 hr.	1795
California Aircraft, Van Nuys, Calif.	A-14-D	Wright 240	1082 hr.	20 hr.	1750
Ray Wilson, Inc., Parkhill Arpt., Denver, Col.	4000	Wright 225	3800 hr.	17 hr.	1650
Ray Wilson, Inc., Parkhill Arpt., Denver, Col.	4000	Wright 225	1146 hr.	21 hr.	1600

DEALERS	MODEL AND ENGINE		TIME	OVER-HAULED	PRICE
Ray Wilson, Inc., Parkhill Arpt., Denver, Col.		Wright J5	608 hr.	81 hr.	$1600
E. W. Wiggins Airways, Norwood, Mass.		S-6000-B	1000 hr.	recently	1600
Bayside Fly. Serv., Muller Arpt., Revere, Mass.	S 6000B	Wright 300	1600 hr.	3/15/39	1595
A. Whitaker, Swan Is. Arpt., Portland, Ore.	4-D	Wright J6-7	860 hr.	110 hr.	1550
A. Whitaker, Swan Is. Arpt., Portland, Ore.	K	Kinner B-5	1250 hr.	110 hr.	1350
Jones Flyg. Serv., Columbus, Ohio.		Wright J-5	500 hr.	May '38	1250
J. A. Field, 17 Forman, Bradford, Pa.	J-5	Wright 225	1000 hr.	recently	1250
Sky Harbors, Inc., Indianapolis, Ind.		Wright	600 hr.	80 hr.	1200
J. Frank Wilson, New Kingstown, Pa.	E-4000	Wright 175	750 hr.	60 hr.	1185
Ashcraft Bros. Fly. Serv., Arpt., Lawrence, Kan.	B-4000	Wright 220		15 hr.	1000
Ray Porter, Chagrin Arpt., Willoughby, O.	C-4000	Chall. 185	650 hr.	just	1000
Odessa Flyg. Serv., Odessa Texas.	4000	Wright 220	506 hr.	489 hr.	1000
Northway Flyg. Serv., Columbus, Ohio.		Wright 220	1100 hr.		950
Bayside Flyg. Serv., Hingham, Mass.	10-D	Wright 250	700 hr.	40 hr.	950
Bayside Fly. Serv., Muller Arpt., Revere, Mass.	10-D	Wright 240	513 hr.	11/10/39	895
Leeward Aircraft, New Kensington, Pa.	C-4000	Chall. 185	718 hr.	13 hr.	885
D. Schall, 33 Claggett Rd., Hyattsville, Md.	Sport	Wright 90	600 hr.	80 hr.	875
A. Whitaker, Swan Is. Arpt., Portland, Ore.		Wright J5A	558 hr.	110 hr.	875
Stinson Flyg. 1044 Airways, Glendale, Cal.	4000	Wright 220	750 hr.	100 hr.	850
North-West Jersey Air Serv., Clinton, N. J.	C-4000	Chall. 185	310 hr.	yes	850
Wright Fly. Serv.,Scott Arpt.,Martins Ferry, O.		Warner 125	475 hr.	105 hr.	775
Hudson Valley Aircraft, Middletown, N. Y.		Kinner 100	800 hr.		750
Hudson Valley Aircraft, Middletown, N. Y.		Kinner 100	800 hr.	3 hr.	750
Dupont Airport, Wilmington, Del.	E-4000	Wright 175	830 hr.		745
V. S. King, Warren Arpt., Warren, Pa.	2000	Tank 73	708 hr.	29 hr.	675
A. R. Currey, 452 Jefferson, Galesburg, Ill.	9000	Siemans 128	700 hr.		595
R. Walling, Arpt., Watertown, N. Y.	2000		200 hr.	10 hr.	500
WACO					
J. W. Stewart, 1319 Avery St., Parkersburg, W. Va.	N	Jacobs 330	105 hr.		6500
E. W. Wiggins Airways, Providence, R. I.	N	285 hp	325 hr.	none since	6500
H. S. Smith, 422 S. Union St., Warsaw, Ind.	Custom	Jacobs 285	210 hr.		4850
Sundorph Aero, Airport, Cleveland, O.	Custom	Jacobs 285	350 hr.	now	4500
A. E. Padage, Wisconsin Rapids, Wisc.	Custom	Jacobs 285	360 hr.	40 hr.	4500
Falcon Aircraft, Inglewood, Cal.	F-7	Jacobs 285	140 hr.		4250
Hawthorne Fly. Serv., Munic. Arpt., Charleston, S. C.	ZPF7	Jacobs 285	600 hr.	250 hr.	3500
E. W. Wiggins Airways, Providence, R. I.	S	Jacobs 225	740 hr.	40 hr.	3500
Chicago School of Aero, Mt. Prospect, Ill.	ZQC	Jacobs 285	790 hr.	500 hr.	3285
E. W. Wiggins Airways, Providence, R. I.	Custom	Wright 285	300 hr.	100 hr.	3000
Sterling Airways, Sterling, Col.	YKS Cabin	Jacobs 225	350 hr.	48 hr.	3000
California Aircraft, Van Nuys, Cal.		Jacobs 285	512 hr.	66 hr.	3000
Sioux Skyways, Sioux Falls, So. Dakota.		Jacobs 225	750 hr.	300 hr.	2985
Mississippi Airways, Jackson, Miss.		Jacobs 225	295 hr.		2800
Daitz Fly. Corp., Roosevelt Fld., Mineola, N. Y.	CUC	Wright 250	315 hr.	15 hr.	2850
R. Turner Aero Corp., Indianapolis, Ind.		Jacobs 225			2750
N. R. McCray, Arpt., Jamestown, N. Y.	CSTD	Jacobs 225	380 hr.	275 hr.	2650
InterCity Airlines, Munic. Arpt., E. Boston,Mass.	Cabin	Jacobs 225	845 hr.	213 hr.	2500
Cape Aircraft, Inc., Hatchville, Mass.		Jacobs 225	508 hr.	17 hr.	2500
Nashville Fly. Ser., Munic. Arpt., Nashville, Tenn.	Custom 35	Jacobs 225	732 hr.	50 hr.	2500
Spartan School of Aero., Box 2551, Tulsa, Okla.	ZKS	Jacobs 285	1100 hr.	400 hr.	2500
Calkins Arcft., 1022 N. Atlantic, Spokane, Wash.	UIC-4-PCLB	Cont. 210	921 hr.	just	2450
Air Ser., Inc., Munic. Arpt., Denver, Colo.	Custom	Jacobs 225	1000 hr.	200 hr.	2400
K. S. Barber, Munic. Arpt., Pontiac, Mich.	YKS6	Jacobs 225	540 hr.	250 hr.	2250
B. F. Hines, Mex.-Tex. Arpt., Hobbs, N. M.		Jacobs 210	400 hr.		2100
J. Ruzicko, Circu City Arpt., Peru, Ind.	1934	Jacobs 225	650 hr.	110 hr.	2000
J. P. Hall, Arpt., West Haven, Conn.	F2	Cont. 165	500 hr.	recently	2000
Phillips Flyg. Serv., Mt. Pleasant, Mich.		Cont. 210	470 hr.		2000
Beebe Air Serv., Hastings, Neb.		Cont.	450 hr.	Dec. '39	2000
Tenn. Aero Corp., Nashville, Tenn.		Cont. 210			2000
J. L. Wells, 106 W. Main, Avon Park, Fla.	YKC	Jacobs 225	650 hr.	200 hr.	2000
Speed's Flyg. Serv., Jackson Hts., N. Y.	RNF	Warner 125	850 hr.	80 hr.	1800
W. F. Luke, Airport, Schenectady, N. Y.		Cont. 210	525 hr.	100 hr.	1650
Airways, Inc., Waterville, Me.		Cont. 210	640 hr.	138 hr.	1600
B. Frame, Lovell Arpt., Chattanooga, Tenn.		Cont. 165	826 hr.		1495
Falcon Aircraft, Inglewood, Cal.	Cabin	Cont. 210	800 hr.	150 hr.	1495
Lexington Flyg. Serv., Lexington, Ky.		Jacob	680 hr.	127 hr.	1475
Reifenberg Aviation, St. Johns, Pa.		Cont. 165	485 hr.		1395
R. E. Lee, Munic. Arpt., Rocky Mount, N. C.	UEC	Cont. 210	870 hr.	9/40	1380
Walz Corp., Central Arpt., Camden, N. J.	Cabin	Cont. 210	1658 hr.	1658 hr.	1275
Arents Air Serv., Armank, N. Y.	OEC	Kinner 210	775 hr.	40 hr.	1275
Bishop Fly. Ser., Arpt., Flint, Mich.	F	Kinner 125	520 hr.	35 hr.	1250
Louisville Flyg Serv., Inc., Louisville, Ky.		Cont. 210	768 hr.		1195
SE Kansas Aircraft, Chanute, Kans.		Warner		150 hr.	1150
O. E. Dickerhoof, Chanute, Kans.		Warner 125	450 hr.		1150
Baker-Eberle, Detroit, Mich.	F	Warner 125	600 hr.	recently	1150
W. P. Snyder, Mulberry St., Kokomo, Ind.	Taperwing	Wright		yes	1100
G. C. Haven, Schenectady, N. Y.		Warner 125	1000 hr.	200 hr.	1100
Aero Serv., Canton, Ohio.	Str. Wing	Wright J-5	800 hr.	40 hr.	1100
Northern Air Serv., Arpt., Grand Rapids, Mich.	KNF	Kinner 100	950 hr.	yes	1050
Racine Fly. Serv., Arpt., Racine, Wisc.	Taperwing	Wright 250	360 hr.	10 hr.	1050
Southern Air Serv., Memphis, Tenn.		Warner 125	1000 hr.	recently	1050
Chapman Air Serv., New Orleans, La.		Warner		50 hr.	1050
R. Seidner, Jr., S.A.M. Arpt., Youngstown, O.	ASO	Wright 220	850 hr.	69 hr.	995
Seidner Flyg. Serv., Youngstown, Ohio.	ASO	Wright J-5	795 hr.	14 hr.	995
N. R. McCray, Airport, Jamestown, N. Y.	F	Warner 125	680 hr.	575 hr.	995
Ranger Flyg. Serv., Ranger, Texas.	RNF	Warner 125	1050 hr.	(1939)	975
J. K. Hinson, Rutherford Field, Woodlawn, Md.	F	Kinner B5	571 hr.	150 hr.	950
Aero Ways, Inc., Cleveland, Ohio.		Warner	801 hr.		950
Greenville School of Aviation, Greenville, O.	F	Kinner 125	1100 hr.	June '40	950
Cincinnati Aircraft Serv., Cincinnati, O.		Warner 125	950 hr.		925
Sky Sport, Cincinnati Arpt., Sharonville, O.		Wright J65	450 hr.	375 hr.	900
N. R. McCray, Airport, Jamestown, N. Y.	A	Jacobs 170	575 hr.	525 hr.	895
Des Moines Flyg. Serv., Des Moines, Ia.	F	Warner 125	688 hr.	10 hr.	765

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